SOFTWARE BOX-PRODUCTS
FOR RADIO BROADCASTING

Demo Package for User Training
not for commercial use

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1. Introduction to the CAPS 2 Radio Broadcast Operating System

About two decades ago when digitised audio and the technology of large storage capacity on Hard Disk Drives appeared as a reality, it became obvious that the marriage between networked computer technology and centralized storage of large amount of audio files, would be a tremendous opportunity to improve the workflow for program production and ON-AIR delivery.
CAPS 2 has been one of the early developments, which introduced this opportunity to the radio broadcast industry.
Within a minimum of time it changed the workflow of small and large radio stations totally and consequently, it became the bases for a revolution to the about 70 years of experienced management and workflow in large and small radio broadcast stations.

CAPS 2, however did refer to this many years of experiences in the field of international broadcasting and combined the new technology by careful conceptual system engineering to a complete and functional system, it is now a modular radio broadcast operating system, combining both, software and adequate hardware components, that allow to carry out all stages of radio program production and the ON-AIR broadcasting process in an efficient easy going workflow.
The software structure permits you to use a great variety of modules to easily adapt to specific stations requirements, allowing you to create and configure a system installation that helps to optimise the workflow for each radio station with individual task related functions.

This booklet, the so called White Paper, is offering an overview to the CAPS 2 Radio Broadcast Operating System, its versatile functionality and the possibility to use it like building blocks for any kind of Radio Station, from a small city station or a university radio to business orientated commercial radio stations without or with regional program content as commercials and local news and station ID's, up to radio houses with multiple Programs ON-AIR and large News departments.

CAPS 2 is based on a very versatile and comprehensive SQL database handling engine.
This Media Database is a special database working under the control of the Microsoft SQL Server 2005. MDB stores descriptions of the elements, a set of categories created by the user, attributes and other information. The main task of the MDB (Media Data Base) is to provide for the well-ordered storage of elements and permitting for the convenient allocation of materials and for fast searches. A large number of CAPS 2 modules use the database for the support of a wide variety of individual tasks.
The redundant data storage for two or even three days of schedules and their related Material at the local harddrive of the ON-AIR station, the so called "reserve system", is based on the versatile MDB management functions, increasing the system reliability and provides failsafe broadcasting, even in the event of LAN or Internet breakdown.

Further on the MDB can be enhances by the specialized "Distributed Data Base" (DDB) handling engine a software building block. The DDB helps building up radio station networks with centralized schedule preparation facilities allowing with the DDB Agent, for the easy exchange of data and audio material between separated locations, which permits for the convenient and fast allocation of content for production and final ON-AIR delivery from any location.
CAPS 2 DDB allows you to build a branched network for the retransmission of radio broadcasts using cheap, low-speed Internet channels, which noticeably reduces the network support expenses, that are associated with standard satellite communication channels or wide band network links.

The integrated administration facilities in the MDB and DDB allow for the limitation of the rights for the user, allowing each one to work only with a certain range of materials and perform only a specifically defined range of actions related to his workflow and responsibilities.
Out of this comprehensive, universal CAPS 2 broadcast operation system the CAPS 2 BOX System has been created as a **self installing system,** avoiding the efforts for system installation to improve

engineering costs for onsite installations where it is not any more required

A wide range of the medium and smaller size radio stations will find all they need in the CAPS 2 BOX System for running an economical, perfect performing radio station.

For such installations which are to be laid out for broadcast operating systems to perform for such requirements, as they will be necessary for large broadcast houses, providing more than one ON-AIR radio program, supported by large production departments for music, program features and a bigger news department, a careful system structure planning is needed. For Installations which nowadays in many cases are to be laid out to cover not only the production and transmission of one radio program has accompanied by a consultancy of system engineering, which has proved to have sufficient knowledge already, to install and setup such a system for an optimized workflow including specific system administration.

For such Installations of the CAPS 2 broadcast system, a more comprehensive description and a system demonstration in a complete demo system will be offered.

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2. CAPS 2 BOX Product System the self installing Radio operating and automation System Software

The CAPS 2 software package consists of the most mandatory parts of a versatile System, assembled to just 8 comprehensive building blocks, providing an ideal radio system installation for all smaller, medium size and even larger radio stations on a start up pricing structure, which is adequate for the budget of such stations.

CAPS 2 is a modular radio automation system based on software components that allows you to carry out all stages of the radio production and ON-AIR broadcasting process. The structure permits you to use a great variety of modules and adapts easily to the radio stations individual needs without creating a redundancy of functions, but instead, allowing you to create a configuration that helps optimize the price. The system is like a set of building blocks that make it easy to build any individual combination of functional workstations according to the customer's requirements.

The CAPS 2 Package includes:

The "Main ON-AIR Station" a software building block with all needed tools for ON-AIR delivery and production. This Main ON-AIR Station includes the SQL database, specialized for CAPS 2 handling, an engine, which permits for the convenient allocation of materials and for fast searches, helps in schedule preparation facilities for the easy access to Media Data and Audio Material.
It does include the "Universal CAPS 2 Reserve System" increasing the system reliability by redundant storage of the ON-AIR schedule and the related Audio Material for 48 hours or more on the ON-AIR workstation, by thus providing failsafe broadcasting even in the event of network server or LAN breakdown.
The BCS Editor software for multi track or single track audio editing, as part of this package improves the production workflow even during an ON-AIR session, due to the total integration in the system functionality. One other main feature for using during the ON-Air session is the integrated VoiceTrack function to prepare for some spare time to record an actual telephone Interview for the actual running program.

The "CAPS 2 Production Workstation" providing the full functionality for the workstation which is used in the ON-AIR editorial department for the editing of the ON-AIR schedule and the ON-AIR material management. The VoiceTrack function for preparing schedules for live style automated broadcasting is included, also accompanied with the tools to optimize the VoiceTrack Jingles and cross fades. Further on it does include the export of the program schedule by merging the playlist to a sound file in an audio file format which can be selected out of the various standard formats. The number of Workstations depends on the program structure and the number of workplaces, designated for this task.

The "CAPS 2 MAG" for computer aided selection and rotation of Music, Jingles and Station ID's, including the tools to build the complete Schedule with news and commercial blocks and all other Items with defined start and stop marks cross-fades and fade out's. The MAG system is working on a sophisticated set of selection rules, based on many years of experience for providing the program adequate type of music selections. Voice tracking is provided also for pre-production with the integrated VoiceTrack cross fade editor. Due to the fact that this music selection and scheduling system is working on the same Database, the reconciliation of the played and not plaid items for the new selection process is a system integrated internal process on one and the same database between the On-Air schedule and the MAG music scheduling process .

The "CAPS 2 BCS Editor" Workstation software for single Track or multi track audio editing, as

part of this package, improves the production workflow, even during an ON-AIR session, due to the total integration in the system functionality. The fragment list for drop in and drop out of partial sound elements which are deposited in that list for multiple use in the editing process.

The "Retransmission" building block does provide the possibility to build a station network for the retransmission of a radio framing program, inserting local commercials and news, using inexpensive, low-speed Internet channels to deliver the regional content on site, which considerable reduces the network costs, that are associated with standard satellite communication channels normally used for this purpose.

The "Logger module", as part of the product building blocks underlines the fact that CAPS is a complete system to run a radio station, beginning with content management and production, providing full functionality for ON-AIR delivery and finally the logging of the transmitted program, or automatic recording of audio material delivery from remote correspondent positions, or telephone answering and recording.

The software tools for importing data from external applications allow using the CAPS 2 System also in conjunction with third party software, as music selection systems as Powergold, Selector or Music Master and commercial disposition systems.

The "Commercials software management" system for the disposition of the commercials and organizing the placement of the commercials in the daily ON-AIR schedule is providing a secure basis for successful business.

A careful combination of hardware and software elements provide a wide and flexible range of remote control to coordinate the systems command controls between the studio hardware as the mixing console and the CAPS software.

A wide choice of remote control devices provides for easy and rational combination of hardware and software elements of the system.
CAPS 2 applications work on Windows XP operating systems. The data management system is built with MS SQL Server 2005.

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3. CAPS 2 BOX Product System Structure

For the first general overview of the functions and features, which are included in each box for self installation, are listed as short form information per each box.

Box No.: 1	**The Main Workstation for ON-AIR Studios** **Self-Installation Package with the listed software modules on the left.** **Providing the full functionality for the workstation which is used in the ON – AIR studio for the delivery of a perfect professional radio program in Live operation or in full automated Play out** **The same Package can be used for the second, redundant ON-AIR / Production Studio**	**including:** **4.1 DJiN Media Database (MDB)** **4.2 MDB Import Application** **4.3 Media Database (MDB) Browser** **4.4 Module File Browser** **4.5 Multi Channel Player (X Player)** **4.6 Reserve System by redundant Storage on the local HD of ON-AIR Station** **4.7 Frame-Program Retransmission Player** **4.8 Jingle Machine Player CartAsisst** **4.9 Block Player** **4.10 PFL Player for Cueing and pre –Listening** **4.11 Skeleton Wizard Module for building ON-AIR (Master) Schedule** **4.12 Clock & Grids Planning tool** **4.13 Track Marking and Normalization Module** **4.14 Start Point Seek Module** **4.15 Module for Recording Voice Tracks in Schedules** **4.16 Schedule Export Module. Merging of Schedule to Sound File** **4.17 Schedule & Player Crossfade Edit Module** **4.18 Module for Export Information about Player Status into XML** **4.19 Gap Filler Module** **4.20 Schedule Import Module (used for schedules from 3rd party applications)** **4.21 Module to generat On-Air Log Reports** **4.22 Broadcast System Editor BCS Multi Channel Audio Editor.** **4.23 Remote control** **4.24 CD Grabber**

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Box No.: 2	**The Production Workstation** **Self-Installation Package with the listed software modules on the left.** **Providing the full functionality for the workstation which is used in the ON–AIR editorial department for the editing of the ON-AIR schedule and the ON-AIR material management** **The number of packages to be needed, depends on the structure of the radio station**	**including:** **4.1 DJiN Media Database (MDB)** **4.2 MDB Import Application** **4.3 Media Database (MDB) Browser** **4.4 Module File Browser** **4.7 Frame-Program Retransmission Player** **4.10 PFL Player for Cueing and pre –Listening** **4.11 Skeleton Wizard Module for building ON-AIR (Master) Schedule** **4.12 Clock & Grids Planning tool** **4.13 Track Marking and Normalization Module** **4.15 Module for Recording Voice Tracks in Schedules** **4.16 Schedule Export Module.Merging of Schedule to Sound File** **4.17 Schedule & Player Crossfade Edit Module** **4.20 Schedule Import Module (used for schedules from 3rd party applications)** **4.21 Module to generat On-Air Log Reports** **4.22 Broadcast System Editor BCS Multi Channel Audio Editor.** **4.24 Grabber**
Box No.: 3	**MAG MUSIC ROTATION** **This Music rotation system does work on the DJiN System Database, by thus providing all information for the reconciliation of played and not played music, creation of play lists for authoring rights e.t.c.**	**including:** **4.1 DJiN Media Database (MDB)** **4.3 Media Database (MDB) Browser** **4.4 Module File Browser** **4.10 PFL Player for Cueing and pre –Listening** **4.15 Module for Recording Voice Tracks in Schedules** **4.16 Schedule Export Module.** **Merging of Schedule to Sound File** **4.17 Schedule & Player Crossfade Edit Module** **4.20 Schedule Import Module (used for schedules from 3rd party applications)** **4.22 Broadcast System Editor BCS Multi Channel Audio Editor.** **4.24 Grabber**
Box No.: 4	**BCS Editor** **Multitrack audio editor for audio recording and editing in the Radio Broadcast editorial department for production of reports, sketches, commercials e.t.c.**	**including:** **4.1 DJiN Media Database (MDB)** **4.2 MDB Import Application** **4.3 Media Database (MDB) Browser** **4.4 Module File Browser** **4.10 PFL Player for Cueing and pre –Listening**

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Box No.: 5	**DJiN RETRANSMISSION** **or** **DJiN REGIONAL PLAY OUT** **Self-Installation Package with the listed software modules on the left.** **This package is provided for such Radio stations which are working in as a relay station for a framing program which is fitted with local program content for some hours** **or** **For providing local content to areas with separate Frequencies**	**including:** **4.1 DJiN Media Database (MDB)** **4.2 MDB Import Application** **4.3 Media Database (MDB) Browser** **4.4 Module File Browser** **4.7 Frame-Program Retransmission Player** **Automatic remote start command for Reransmission by selection of :** **GPI/O Control** **DTMF Control** **for Regional Play Out by:** **serial interface or** **TCP / IP and UTP Protocol**
Box No.: 6	**AUDIO LOGGER** **Self-Installation Package with the listed software modules on the left.** **For long term storage as on AIR content reference** **For Air Check to optimize Moderator performance**	**including:** **4.26 ON-AIR Logger** **Recording for 2 Stereochannel**
	Optional	**For each additional Stereo Channel**
Box No.: 7	**DB Browser** **(only for Network Systems)** **Minimum Order** **for 5 User Lizenz**	**including:** **4.3 Media Database (MDB) Browser DB** **for DJIN MDB Database access, pre-listening and insert of Broadcast elements**
Box No.: 8	**COMMERCIAL MANAGEMENT SYSTEM** **Self-Installation Package with the listed software modules on the left.**	**including:** **Sales support,** **Commercial scheduling**
	Recommended Hardware	
	Remote Control Interface TP314 **with Metal Case for external mounting to computer**	**include:** **USB Input from ON-AIR Station** **8 GPO Opto decoupled Transitor Outputs** **8 GPI Opto decoupled diode inputs**
	Remote Control Interface TP314 **for Slot Mounting in Computer**	

4. Description of the Main Functionality and Features of the CAPS 2 Box Components

This section describes the various functions of the CAPS 2 radio automation system that can be described as elements or building blocks. They are combined together in the different Boxes in such a way to optimize the workflow in reference to the needs of any Workstation. This also ensures that nothing unnecessary is included in the system, meaning that the customer doesn't end up paying for something he or she doesn't need. Maintaining only those elements necessary will also prevent overloading of the user interface.

When we refer to a "function", we mean either an element of some application (e. g., player, in the on-air application) or a separate application designed for carrying out of a specific task (e. g., the music play-list generation application MAG).

In some cases, we describe these functions as software module, or simply module. The control panel for a module may also be visible on the monitor screen. Other modules do not have control panels and their parameters can be set through the system for setting general parameters.

Some applications have personal names, e.g. on-air application DJIN, musical play list generation application MAG etc.

4.1 DJiN Media Database (MDB)

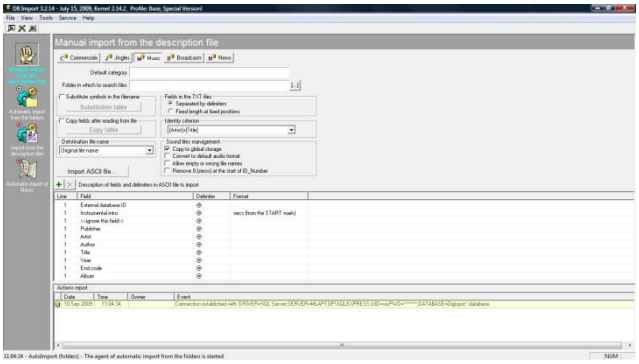
The Media Database is a special database working under the control of the Microsoft SQL Server 2005. MDB stores descriptions of the elements, a set of categories created by the user, attributes and other information. MDB structure provides for the allocation of elements according to categories. A single element may belong to several categories. A lot of useful things can be done using the database: the establishment of a hierarchical category structure with unlimited nesting capacity, provision of a fast search engine with complex search conditions (e.g. you can easily obtain a list of titles written by one author, of all news items prepared by the same journalist), and much more.

The main task of the MDB is to provide for the well-ordered storage of elements for easy and fast searches for material when it is needed.

The integrated administration facilities allow for the limitation of the rights of a concrete user, allowing him to work only with a certain range of materials and perform only a specifically defined range of actions.

A large number of CAPS 2 modules use the database for the support of a wide variety of individual tasks.

4.2 MDB Import Application



The MDB import application allows you to add new material automatically to the Media Database (MDB) Of the CAPS 2 System from files, folders or external databases. There are several methods of data import. In the simplest case, it allows you to add files appearing in specified system folders. Every folder can be configured as a source of a certain MDB category. Description data (or meta data) can be taken from a neighbouring ASCII file residing in the same folder as a data file. The format of this ASCII file can be configured. In another case, we can perform an analysis of description information from specified folders in order to find out the exact place where new data files and their descriptions can be found in the system. It is possible to organize the synchronization of the musical database with the external rotation system or the commercial database

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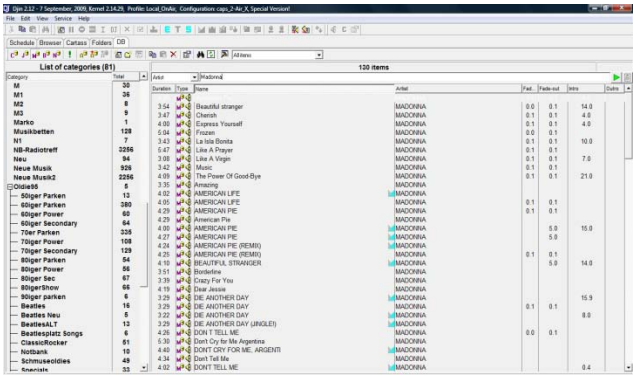
with the external system for commercial schedule planning. Further on different files can be obtained from Internet sources (e.g., using FTP access) or News agencies for the news department. For the text import special filter can be configured to organize the incoming material direct in defined categories for immediate access.

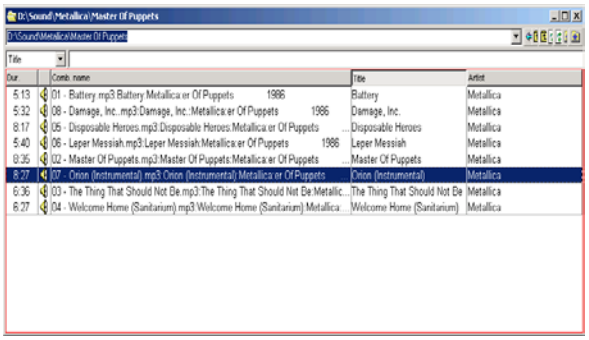
4.3 Media Database (MDB) Browser



This is the main module for communicating with the Media Database (MDB). All functions of DB access are supported in that window: preview, search, sorting, filtering, adding, erasing of elements and categories, and other operations. Besides this, the module also carries out some administrative functions: the setting of database parameters, adding and erasing radio stations, the recovery of elements being erased by mistake, and some other specialized functions. The number of possible operations can be limited by the administrative system of the CAPS 2 radio automation system. You can print out the contents of any MDB category using the report skeleton.

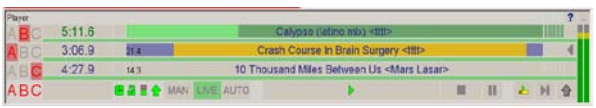
Media database is a specialized database operating under Microsoft SQL Server 2005. The database contains descriptions of items, a set of categories and attributes created by the user, and other relevant information. The database solves the problem of categorizing the items, allowing an item belonging to several categories at the same time. Some of these capabilities are as follows. It allows for a hierarchic category structure with an unlimited number of nesting levels to be created. Also, items that have the same value for a certain attribute can be filtered out. For example, all songs by a certain artist or all news items prepared by the same reporter. Items can be searched for using compound search conditions. This list of database capabilities could go on, but those already enumerated should be sufficient to give an idea about its advantages. The main task of the database is to store items in order for rapid location of the needed material. The built-in administration system makes it possible to limit the rights of an individual user, allowing him or her to work only with the necessary materials and perform only a predefined set of functions.

4.4 Module File Browser



The files module window allows you to play back audio items (elements), preview information and edit the descriptions of audio elements. The user can access both the local hard disks of the workstation and of network disks. The operator gets information about the sound file format and duration of the audio item. Depending upon the file format, some additional information can be accessed, such as text description, marking of an audio item, etc. Information of this type can be viewed and edited and sorting by the fields is possible. Frequently used folders can be put into Favourites for fast access. Selected files can be added to the Media DB, schedule, players and other system modules.

4.5 Multi Channel Player (X Player)



The X Player is the result of the development of double player. The X Player can also deliver a sequence of elements on-air as they are indicated in a schedule, although it features extended functionality.

The player can be used in a system with several physical outputs (up to 4).

The player window depicts a queue of

elements with defined depth (contrary to a double player, which shows only the currently playing and next elements). It is possible to edit the queue of elements inside the player. It is also possible to open crossfade editor and to add new elements that are not listed in a schedule. It is possible to edit the crossfade of element being played with the next element (double player does not allow for this). X player features a new function:

A search for the start point for every element being loaded into queue. This mode can be supported effectively using a number of buttons on a computer keyboard or by a dedicated remote control unit – an external button field.

Another feature of this player is that it allows you to assign a certain physical output to audio element. for example, it lets you play musical elements via one output and voice elements via another. The signals for these channels can be processed separately by FM processors with different settings, providing better audio quality results in radio output. X player can distribute audio elements automatically by physical outputs according to their type (voice track, commercials, music, etc.) and to the DB category to which they belong. It is possible to define this manually for a certain audio element either beforehand, during schedule preparation or element meta data description, or in the player itself before actual delivery on air.

There are 3 modes of operation for X player, distinguished by the degree of manual control provided by the operator: MANUAL, LIVE and AUTO.

MANUAL mode assumes that the operator starts playback of every audio element by him or herself. In LIVE mode, playback is performed automatically, but can stop in special places of the schedule if this was planned beforehand. The operator then has to launch playback manually. The operator may then influence the playback process at any time, either by starting the next audio element or by stopping that currently being played. This is intended as the chief mode for X player. The AUTO mode provides a full autonomous mode of operation. Broadcasting does not even stop at the special points mentioned in a schedule. The operator can employ a non-planned-gap filler if necessary. The player can be controlled remotely by "Fader Start" and "Cue" signals from the mixing console and from the external button field. X player is mostly effective in the systems with a DB and voice-track recording module.

4.6 Reserve System by redundant Storage on the local HD of the ON-AIR Station

This module solves two tasks: Providing uninterrupted broadcasting in the case of LAN breakdown and the physical delivery of audio material to the exact place where it should be played. The idea of this module is to perform background copying of all of the audio elements used in a schedule to the local hard disk of the on-air workstation. During playback, the system checks if a copy of next audio element exists on a local HD. If it exists, then it is used instead of the distant audio element. If the original audio element is changed somehow, then the copy will be updated automatically. Audio elements that are used as a reserve are stored for 2 days, which helps to eliminate the frequent copying of the same files. Thus, when the system is set up carefully, the broadcast never happens from a network, as the network is being used only for preliminary copying of files. Besides audio elements, the schedule itself is also being copied. So, in the case of a network breakdown, the on-air station has both the schedule and data on its local hard drive to provide at least a day of broadcasting. After the re-establishment of the network communication, the system will automatically synchronize schedules. The usage of lower-bit-rate channels like slow Internet between the on-air workstation and the production/planning workstation is possible due to a Reserve module that can transfer all the needed data to the local hard disk in advance. In special cases, it is possible to organize broadcasting with a connection channel that does not provide real time throughput of material. Assume that the material volume is not so high, like when we need to transfer just 10 minutes of commercials per hour, and that the communication channel provides a transfer rate of a half the playback rate (64 Kbit/s). To transfer 10 minutes of audio, you will need 20

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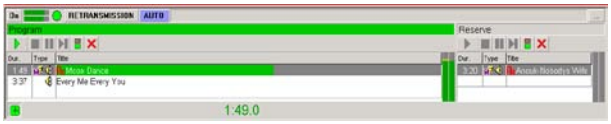
minute of real time. But, if the schedule is prepared beforehand (one day in advance), all the necessary files will be transferred safely to the on-air workstation before the moment of actual delivery on air.

4.7 Frame-Program Retransmission Player

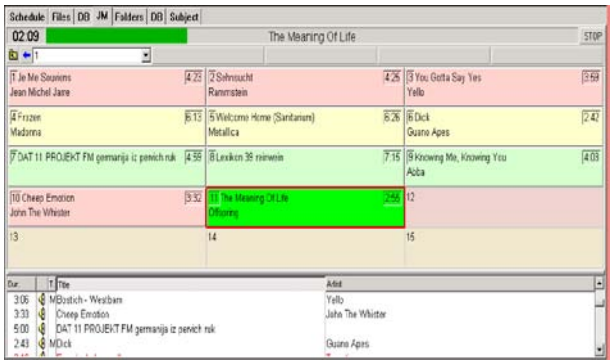


The main difference between retransmission player and the other players lies in the presence of an embedded switcher, which provides for change-over from the retransmission signal (frame program) to the regional signal (own program). This switching can be performed either manually (from mouse/keyboard or GPI signal) or automatically (according to time or a command from an audio-pattern recognition module). With the reception of a command, the switcher initiates the playback of audio material loaded into the player while simultaneously (or even earlier – depending upon the settings) fading out of the retransmission signal. Thus, the system enters the own-program delivery mode. Upon the completion of the loaded block playback (or even earlier), the switcher starts fading in the retransmission signal, bringing the system back to retransmission mode.

The blocks of the regional program are loaded to the player from the regional schedule automatically in advance of their actual air time.

If a retransmission signal fails, the system launches the guard player, containing a reserve block of audio items.

4.8 Jingle Machine Player CartAsisst



Jingle machine player is used for the instant (one-key) start of a necessary audio element. Audio elements are represented on a monitor screen in the form of a spreadsheet. This allows for the easy location of the necessary element among all others. The remote control of such a player from an external button field is

also intuitive and simple (the geometry of the button field — the number of rows and columns — should fit into the outlook of a jingle machine table). Any player element can be started by the press of a button either on the computer keyboard or the external button field. This player can play audio elements from Jingles categories.

The player is most often used in the following two ways.

In the first, the player is used as intended for airing various audio items: audio effects, background sounds, etc. Most often, this is necessary when preparing live broadcasts, interactive games, etc. The operator can prepare the needed audio items in advance and place them on the buttons of the jingle machine in the way that is most convenient for him or her. This can be done not only from the broadcasting station but from any production workplace. This player variation is included in practically all typical configurations of the CAPS 2 DJin program.

The other method presupposes using the jingle machine as a data source for a group of block players. Button field buttons can be used to switch to another category. This makes it possible to organize a system for rapid navigation over the collections of audio items prepared in advance. In this case, clicking the jingle machine button in the button field simply selects an audio item. It can then be added to

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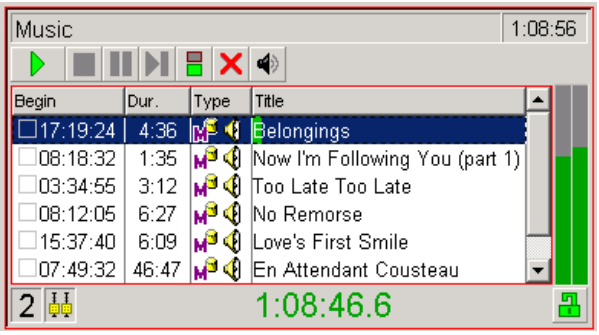
the end of the block player play list by clicking the corresponding button-field button, which allows a play list to be prepared rapidly. In this version, the greatest efficiency is achieved when the jingle machine is used with an external specialized button field that has both the jingle machine control button and the block control buttons. Specialized remote control devices manufactured by Eela Audio can be used as these external button fields. Another option is to use specialized computer keyboards, the keys of which can be combined into buttons and have commands assigned to them.
A typical configuration consisting of a jingle machine and block players is called a cart machine.

4.9 Block Player



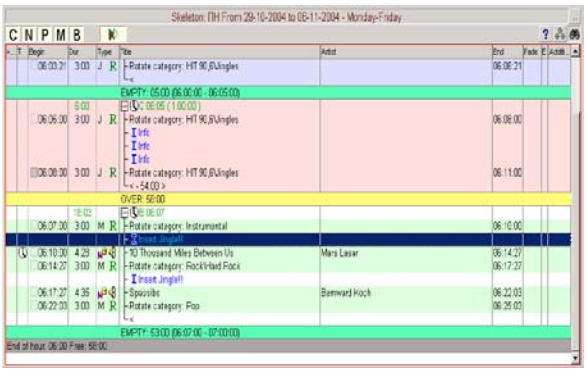
Block player can be used for playing sequences of audio elements (play-lists). Playback is carried out via a single device, taking into account crossfades between elements. The play-list represents a single block of the schedule. All means of schedule editing with regard to audio items (crossfade, marking, normalizing, go to next, voice track recording) can be applied to contents of the block player. Playlists can be loaded to the player automatically from blocks of the schedule or manually by the operator. A combined approach is also possible. In this case, the schedule should list only obligatory material to be delivered on air while all other elements (audio items, jingles, etc) can be loaded manually by the operator from a Media DB, F-Categories, Jingle machine, Files and other windows. Player can be controlled from a mixing console with the help of the "Fader start" and "PFL" signals. Player can be set for automatic start at a specified time or it can wait for a command from the operator. There are a large number of parameters that define player behavior.

A system usually has a number of block players, each of which has its own responsibilities.

4.10 PFL Player for Cueing and pre – Listening

The CAPS 2 system does provide a versatile functionality to pre-listen to an audio Item at any time in any module of the software, inside every position of the schedule or the Player even if the Audio item is already playing ON-AIR to pre-listen the ending.
In the CartAssist Database window and in the block player. Te command is activated by the Mouse pointer in the related window by aclick of the left mouse button or by a special key from the key board or dedicated key pad.
Moving the mouse pointer left and right it is even possible to scrap through the audio for the right point of listening.

4.11 Skeleton Wizard Module for building ON-AIR (Master) Schedule



The skeleton master provides for the formation of the thematic broadcast net and the optimisation of the schedule- preparation process. Skeletons are common, periodically repeated building blocks of the schedule. The first task to be solved for a newly created radio station is that of defining of the volume and thematic content of material to be broadcasted. In "skeleton master terminology", this can be described in a set of blocks of appropriate types, their lengths and on-air times. Skeleton master allows you to form the needed sequence of blocks that will be automatically copied to any new schedule. If the radio station's format changes depending upon the day of the week, this can be taken into account while

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creating a set of skeletons. Skeletons can be assigned to specific dates or to cyclically repeated time frames. The skeletons system has a hierarchical structure, so during schedule generation the system will automatically choose the most appropriate skeleton for the date in question.

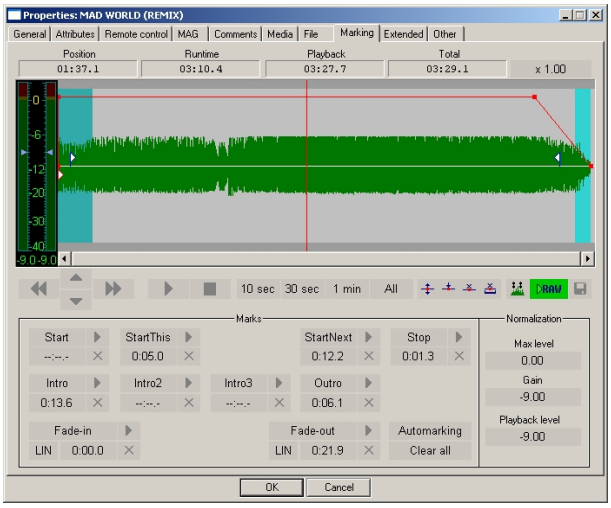
If your schedule features constant elements like jingles, background sounds etc, it is sensible to mark them in skeletons and the schedule operator will be saved from the routine tasks of adding these elements manual. It is possible to set up a jingle rotation in a skeleton. During schedule generation, the system will take one of the jingles accessible to the rotation and put it in the appropriate place, so the operator will not need to rotate jingles manually.

The user interface for skeleton master is almost identical to the schedule window interface, making it easier to learn it. Conflicts and errors are marked graphically during the planning of the blocks net. It is possible to work with skeletons from practically any workstation in a network that includes the skeleton master module. The new schedule will be generated according to the skeleton, independently of the workplace where it was constructed.

4.12 Clock & Grids Planning tool

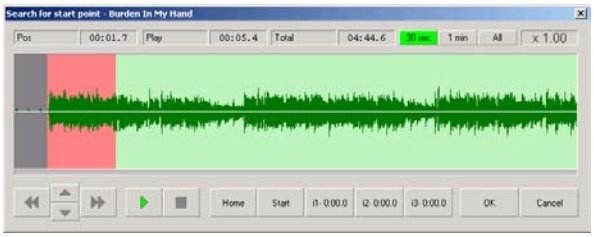
Software modules to support the production and editing of the daily ON-AIR Schedule. Providing the logistics to coordinate Commercial and News fixed ON AIR time with the Music clock and all in between elements for the actual play-out.

4.13 Track Marking and Normalization Module



This module prepares audio items (phonograms) for the Media DB. The module can automatically define a pause in the beginning and in the end of an audio element, set the start and stop playback marks, estimate the signal level and normalize it if this is needed. This module saves the operator from routine work on each every audio item.

4.14 Start Point Seek Module



The start point seek module defines the exact piece of the audio element that will be used as a start point during playback. You can assign the start point to any of the three previously defined character points of the audio element (INTRO) or search it by playing the element at a different speed and in different directions. The search window shows the waveform of the audio, which simplifies the process. It is possible to change the start point of the audio element either from schedule or in a player. This function is often used by on-air operators when they need to change the INTRO duration of a musical element. You can control the process either from a computer keyboard or from an external button field.

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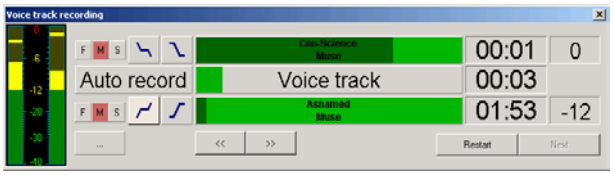
4.15 Module for Recording Voice Tracks in Schedules



Its responsibility is in the recording of audio (usually voice) fragments during crossfades from one audio element to another. Maximum performance can be achieved using the special remote controller that provides information about the dynamic positions of the two faders to the workstation. One fader provides fade out of the first audio item, while the second fader provides the fade in of the second audio item. The start of the second audio item is initiated by the second fader start signal, so voice track recording is reminiscent of the real on-air process. The software application will remember the fader's movements and, while on-air, it will imitate them, providing a feeling of a live show. During crossfade rehearsal, the operator can switch on the recording process and record a voiced section that will be played through the crossfade. This module can be used without a special remote controller, but this implies some limitations. At present, it is possible to control the start point of the next audio item and switch the record function on and off. The schedule can be marked preliminary at the places where voice track elements are needed. Afterwards, the voice tracks can be recorded one after another.

4.16 Schedule Export Module. Merging of Schedule to Sound File

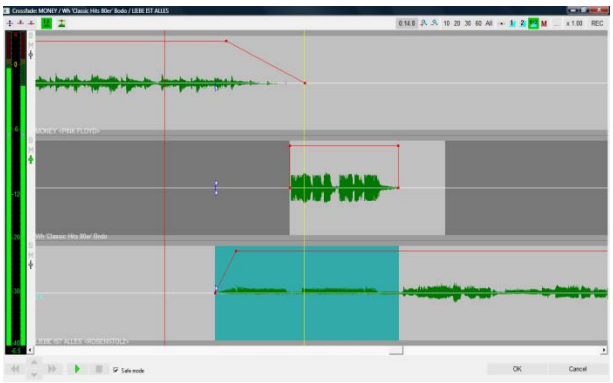
This allows you to export all schedule content material (or some of it) to standard format audio (sound) files. The resulting file can be created much faster than it occurs in real time during on-air playback. All data like block and audio item attributes, crossfades, etc., are taken into account during this process.

As an example, you can merge a day of schedule material to 24 1-hour long sound files. It is also possible to store commercial/news elements in the form of sound files. Each file will represent a prepared block of commercials or news.

This module can be used in news and advertisement agencies and at the center of network radio stations. Ready sound files can be transferred to other radio stations where any automation system can provide their playback on air. Thus it is possible to use our system of planning/ production at the centre and any other play-out system at regional radio stations.

The digital audio format of the merged audio can be defined in most of the common Versions.

4.17 Schedule & Player Crossfade Edit Module



This module allows you to create cross-fades between neighbouring schedule elements, providing more dense and accurate broadcasting without pauses between audio items. It can "glue" 2 or 3 neighbouring audio items that are located in the same or in neighbouring blocks. The user interface of this module is similar to the BCS editor, so a user who is familiar with it will not need much time to get going. Cross-fade editing can be done either in a schedule window, from any workstation in the network, or inside the play list of a block player, but only at an on-air workstation. The block player can provide a cross-fade of an already playing audio element with the next one, while the schedule window allows for the cross-fade of next element after that being played.

4.18 Module for Export Information about Player Status into XML

This software module provides some status information to the external systems in XML format. This information refers to the currently playing audio elements and those

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that are ready in the playback queue. Any player in the system can provide this information, which can be stored in a previously specified folder and updated dynamically according to the status of a system. Files of the XML format hold the audio element name, duration, author, etc. They can be used by external applications for various purposes, eg. for the generation of an RDS text string or placing data on the radio station's web site.

4.19 Gap Filler Module

Gap (or unexpected and non-planned pause) filling technology is necessary for radio stations with full or partial autonomous broadcasting. When a non-planned gap occurs (due to a breakdown iin communication lines, planning errors, etc.) the gap filler module automatically prepares a piece of schedule from the elements stored in the database. This audio content will fill the gap until the system gets a valid audio element from the schedule to play. There are different algorithms for filling long (minutes) and short (seconds) gaps. These algorithms are developed in a way to provide the smoothest possible fill in for the program failure. System administrator can set up parameters for the gap filler, which can vary for different time intervals. The administrator can assign special DB categories, filling skeletons and other parameters. Special diagrams are provided to indicate the effectiveness of the gap filler.

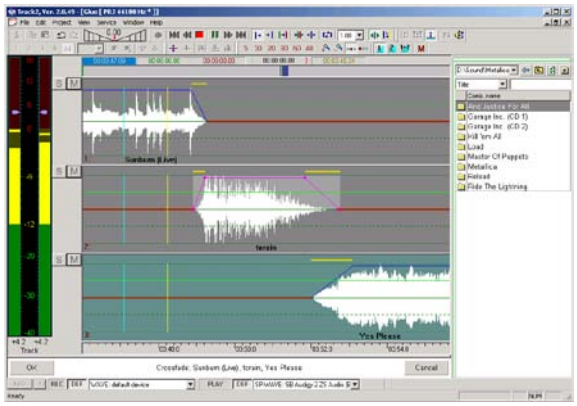
4.20 Schedule Import Module (used for schedules from 3rd party applications)

The schedule import module provides for the import of ASCII files with a schedule prepared by a 3rd party application (like Power Gold or Selector). The import module has a flexible settings system that allows you to choose the necessary types of fields, types of blocks and other parameters. The module can be configured for import from practically any known ASCII file format that holds something similar to a schedule. In special cases, we can provide pre-processor utility for preliminary processing of an ASCII file before it can be imported into the system. In practice, almost every big radio station using our system is importing a schedule or parts of it from one or another external system as Music selection systems or Commercial disposition applications.

4.21 Module to generat On-Air Log Reports

This module generates an ASCII file with information about audio elements that had actually been played on air. The file stores information about the time at which each item was played, player name, fader condition and item details (file name). This file can be printed out using the report skeletons form.

4.22 Broadcast System Editor BCS Multi Channel Audio Editor.



The editor is a separate application that can be installed on workstations together with other applications of the system or as a stand-alone application. It allows for the production of proprietary audio and text material for later delivery on air and for refilling and/or editing of the MDB. The close integration with the on-air application and the presence of common modules facilitate easy learning of the system and simplify the handling of overall operations. While working with the MDB, you have to take special care of the administration system. You can limit a number of categories and functions available to the operator in everyday work. This helps to differentiate strictly the functions of every workstation in large systems, eliminating unauthorized access to material from unwelcome places.

The application is oriented toward the easy implementation of standard editing operations used on radio stations: recording, editing, level control, external plug-in

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support (DirectX plug-ins). Editing can be performed on one or more tracks, while recording can be done only on one track.

4.22.1 "Fragment Buffer" Module

The "Fragments buffer" module provides the means for the temporary storage of pieces of audio and text in the editor application and actually works as a specialized multi-level clipboard. It can be very useful when source material has to be edited severely and cleaned from unneeded parts. In such cases, search operations can take a lot of time.

This buffer preserves its contents after the restart of the application so that it can be used for the "long term" storage of frequently used elements, such as jingles and music beds.

4.22.2 Plug-ins Interface Module

The plug-ins interface module provides the possibility to use 3rd party plug-ins supporting DirectX technology. A selected fragment of audio track can be processed by a chosen plug-in or a chain of plug-ins. This module allows to save and load presets. It has several auxiliary modes: rehearsal mode, looped playback, and bypass.

4.23 Remote control

Supports

RS232 serial Interface

GPI/O commands,

TCP/IP and UDP Interfacing Protocols

Reception of 4 GPI signals via LPT port without additional hardware.

Flexible RS232 protocol and TCP / IP can be adjusted to communicate with various pieces of equipment including the input for Fader control information from mixing console which can provide the Fader Position as serial data.

External Remote TP 314 control box has 8 GPI, 8 GPO with USB port.

An external button field can be embedded into a mixing console or the table beside the mixing console.

A number of widly used Mixing consoles as DHD , AXIA and D.Max are already fully interfaced to the CAPS 2 System by means of serial or TCP/ IP protocols.

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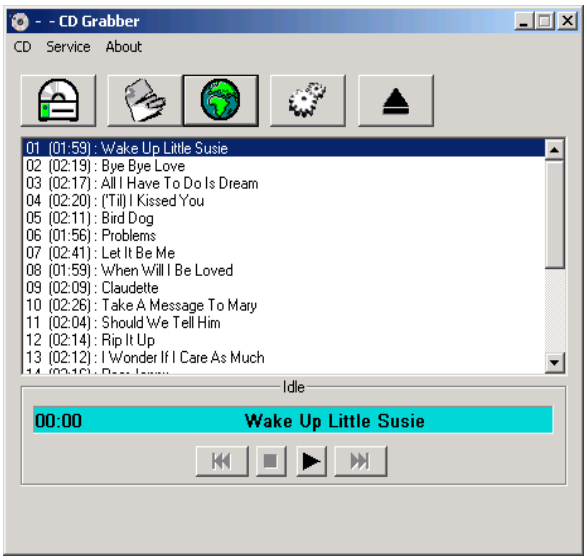
4.23.1 Grabber


- - CD Grabber
CD Service About
01 (01:59) : Wake Up Little Susie
02 (02:19) : Bye Bye Love
03 (02:17) : All I Have To Do Is Dream
04 (02:20) : ('Til) I Kissed You
05 (02:11) : Bird Dog
06 (01:56) : Problems
07 (02:41) : Let It Be Me
08 (01:59) : When Will I Be Loved
09 (02:09) : Claudette
10 (02:26) : Take A Message To Mary
11 (02:04) : Should We Tell Him
12 (02:14) : Rip It Up
13 (02:12) : I Wonder If I Care As Much
Idle
00:00
Wake Up Little Susie

This module is used to import information from audio CDs into files. During the copying process, the signal can be normalized, compression into MPEG performed, gaps at the beginning and the end of the track removed, etc. The application automatically accesses a CD database on the Internet and reads information from it about track names, performers, and the like. The imported information can be automatically added to the specified MDB categories.

Remark :

It is not possible to use this tool for protected CD's

4.24 Musical Schedule Generator and Jingles Rotation Application MAG

The separate MAG application is aimed at the automatic generation of musical play lists, like popular applications such as Selector, Power Gold and Music Master. Taking into account their broad orientation, these applications are overloaded with functions and options that make the everyday work of personnel difficult. Users often use no more than 20% of their functionality.

As with these applications, our MAG uses a principle of the rotation of musical material. Each musical element is accompanied with a description "card" providing so-called "meta data" for every title in a record library. All musical elements (songs) are divided into categories. Within the category limits, songs form working virtual stacks that are rotated according to the hourly net defined by the user. The user sets special parameters describing the selection process of a song in a stack, defining the necessary rotation rules and assigning priorities to these rules. The application automatically generates a play list, which can be edited.

MAG includes several methods of musical-element-rotation control. They can be divided into two large groups using the artistic characteristics of songs and historical mathematical rules. The first group provides rotation control according to artistic rules that were defined by the user: tempo, the "texture" of musical material, mood, etc. The second group of rules is based on the control over the time of the possible playing of music elements relative to the time of its last usage.

MAG follows rules set by the user. These rules tell the system how to interpret different artistic characteristics of the musical element or the time of its last play on air.

The rules are very flexible. Each user can employ them according to his or her individual expectations. Everything depends upon the concrete format and goals of the radio station.

4.25 On-Air Logger

This module is used to record the signal from the workstation's external to the hard disk automatically. A typical application is the around-the-clock high-compression recording of broadcast material and its subsequent 31-day storage for the content control purposes as required by the Legislation Regarding Mass Media. Another common application is the high-quality recording of broadcast fragments for subsequent playback or for using the recorded material to prepare your own programs.

The recording panel of the application contains an extensive set of parameters. Turning recording on/off can be initiated according to a schedule, using a specific signal level at the input or by GPI command. The system can use one stereo input as two independent mono inputs and can record

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different programs with independent settings. It is possible to determine the compression ratio, shelf life and other parameters.

The number of recording modules present in the system is unlimited, so it is possible to set up multi channel recording of the signal.

A logger client software module can be obtained for any workstation in the radio station network system. By thus, providing easy access for the program department for checking and re-use of material. Also, to assemble sequences of commercial play out for customer reference.

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5. The Structure of Radio Stations

The details of the new CAPS 2 II System have been defined by the requirement for a smooth and fast workflow for production and ON-AIR delivery for Radio Stations.
The CAPS 2 II software development in conjunction with concept engineering for the radio industry does provide a wide range of technology and tools for Automation, providing the bases for adequate and modern design of all kinds of radio station structures.

When planning to renovate the station or replace equipment, the technology already in place at the radio station has to be taken in account in conjunction with the intention for improvements the new installations should provide. If the radio station is going to broadcast live programs, then it is necessary by all means to provide live-program support. Live on-air broadcasts require DJ live inserts for informational and promotional messages, microphone inserts for moderators and guests in the studio, the ability to broadcast telephone conversation on air, etc. The Software of the radio station operating system and an adequate ON-AIR mixing console should be selected as an inter –coordinated System for an easy going and efficient Live Program presentation.

The automation functionality of the software system provides considerable cost savings for radio station, by pre-produced ON-AIR schedules. A workstation together with a small mixing console can be used for pre-production including inserting of commercials, news and other kinds of broadcast material.

The type of program and it's list of content does finally define the size of system installation in regard to software and hardware. The range of program content will be defined by the general orientation of the radio station to be a music station or a 24 hour news and information provider or a combination of both in different percentages of both, music and news.
The choice of the program type will determine the needed production capacity in personal employment and the technical Installation, which will allow to avoid missing equipment for an efficient workflow or unnecessary investment in not fully used workplaces. At the same time, to allow for the full installation of necessary technology for aiding in production and maintaining the necessary reserve capabilities.

The main points to be looked at for the definition of the radio station structure.
Daily broadcast volume and the amount of its content that will involve the station production capacity. This parameter influences the volume of reserves necessary, and the quantity and balance of various workplaces in your radio- operating system.

The correlation between various types of broadcast materials in the program: music, news, commercials, pre-produced programs. This helps to define the genre of a radio station and influences the structure of the whole.

The structure of the station and it's investment on System Technology will also depend on the time frames with live moderated programs and time shifts with VoiceTrack prepared programs running in automation.

Buying external content material and in what form, can be considered. Finally the necessary investment will depend upon the type of material intended to be produced in house: commercials, news, music play-lists, pre-produced theme programs, etc.

Retransmission: Will retransmission of a frame program be a choice for stations being organized in a radio station chain.
The following samples might help to orientate the general structure of the intended installation.

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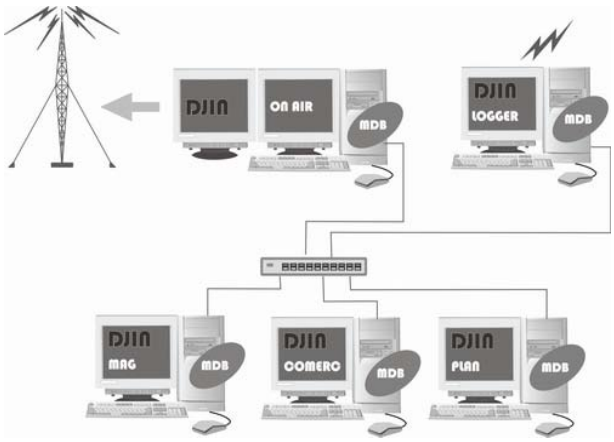
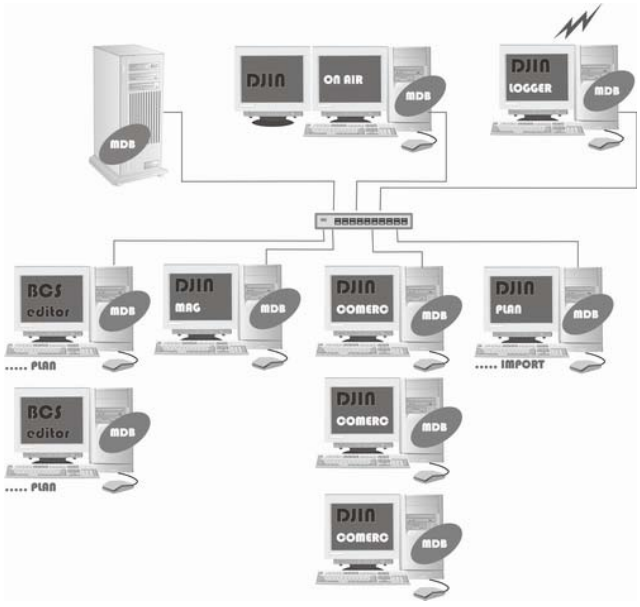
5.1 Small Music Radio Station



This is a typical musical radio station for medium-sized and large big cities. It broadcasts its own programming 24-hours-a-day The main part of the content is provided by music of a particular format.
The radio automation system consists of 4 working places:
On-air workstation
Musical play-list generation workstation MAG
Commercial-planning workstation: schedule preparation station plus schedule and data import option.
On-air recording workstation: Logger

5.2 Average Music and Informational Radio Station



Such radio station broadcasts its own program around the clock. Music is used as a background element for on-air decoration. Information content: news, city info (traffic, weather, sports), pre-produced thematic programs etc.

On-air workstation

Music play-list generation workstation MAG

Commercial-planning workstation: schedule preparation station plus schedule and data import option.

Journalist workstation (2 stations), audio editing station, plus schedule editing option.

On-air recording: logger

5.3 Auto Retransmission (DJIN 777)

This product is designed for networked regional radio stations retransmitting a frame program while including fully automated their own commercials, news, etc. It consists of a single on-air workstation with DJIN 777 Software package .

5.4 Small Retransmission Radio Station (DJIN 777+)

General characteristics of a small retrans-mission radio station:
The main task of the radio automation system here is retransmission and the automatic inclusion of regional commercials.
Radio automation system consists of two workplaces. The ON-AIR workstation and
the production workstation for the schedule preparation station, plus the schedule and audio data import options. The CAPS 2 Commercial Data Management System can

also be installed on this workstation.
Both computers are connected to the local network. The production workstation may also use a separate traffic manager application for the generation of a commercial schedule and its export to an ASCII file.
The ON-AIR workstation should have a digital audio card corresponding to thw needed functionality of crossfading between the play out signal from the local harddisk and the audio card input signal , e.g. Digigram VX222, Marian trace Pro or Trace Alpha as well as the Yellowtec PUC 2 USB audio pay out unit , The planning workstation may use any sound card for the pre-listening function.

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6. Hardware

This section deals with the hardware that carries out the functions of our software system. We consider the following subjects on the following pages :

- **PC requirements: hardware, network, and operating system**
- **Digital audio cards**
- **Remote control**

6.1 General Equipment Requirements

The CAPS 2 radio automation system creates high reliability requirements for computer hardware. In order to provide for the handling of audio MPEG or PCM streams, you don't need the most modern processor or fastest RAM. But the hardware must provide continuous fail-safe functionality for the system in the course of long-term operation. We recommend using equipment from well-known manufacturers that has already proved its quality and reliability. We recommend performing tests on this equipment in severe conditions during a long period to ensure concordance with the declared characteristics.

Special attention is required when setting up the device drivers and operating system parameters. Incorrect settings may lead to non-systematic failures while on air.

On-air computers should use a multilayer reserve system: uninterrupted power supplies, 2 or 3 power supplies in the case of one computer as, additional ventilation fans, a temperature and power-control system, and a fan-speed indication system.

For the comfort and convenience of the on-air operator, we recommend using 2 and 3 monitor configurations. This helps to provide the most necessary information on monitors in an adequate and understandable format and with eye-friendly density.

We recommend setting up on-air material and the system root directory at a separate file server on the basis of RAID massive. Total storage space can be calculated out of the needed on-air material volume and audio bit rate.

6.2 General minimum requirements for the PC:

6.2.1 ON-AIR Station:

CPU: PIV and higher, RAM: minimal requirements for operating system +512 MB, HDD: 128 MB + reserve system requirements (=daily on-air material volume X number of days to be reserved).

6.2.2 Planning Station:

CPU: PIV and higher, RAM: minimal requirements for operating system +512 MB, HDD: 128 MB

6.2.3 Editing Station:

CPU: PIV and higher, RAM: minimal requirements for operating system +512 MB, HDD: 128 MB + locally stored audio material volume.

6.2.4 Logger:

CPU: PIV and higher, RAM: minimal requirements for operating system +128 MB, HDD: 64 MB + space for storage of recorded material during needed time frame.

6.2.5 Retransmission Station:

CPU: PIV and higher, RAM: minimal requirements for operating system +256 MB, HDD: 128 MB + reserve system requirements (=daily on-air material volume X number of days to be reserved).

6.3 Conditions for Network Performance

Requirements for the components of the local network can be formulated as follows: component characteristics must correspond to the parameters declared by the component manufacturers.

The most important factor here is network throughput: It should correspond to broadcasting requirements. If playback is taking place from the file server, then the stream between the file server and the on-air workstation may reach 500-700 KB/sec (if working with non-compressed audio). In order to facilitate this, you can use 10MB/sec networks. But, in this case, there should be no other workstation that can overload the channel file server – on-air workstation. We recommend using networks with 100MB/sec throughput.

A very important parameter for the network is the network file access timeout (file read, write and open requests). Incorrect network settings may result in on-air failures! That is why it is strongly recommended to provide conflict-free network settings. The average response network time to read/write requests should not exceed 100 milliseconds, and the average response network time to open/create file should not exceed 200 milliseconds. Breaking this rule may lead to interface freezing for random applications. In the case of relatively long freezing, on-air gaps may occur. Such things happen often in office networks, but they are not catastrophic and are often not even noticeable. But they must not happen at a radio station, when an on-air gap is audible and disturbing.

The CAPS 2 radio automation system works on the Windows XP operating systems. Which is recommend for Systems with digital Audio and Video Signal handling.

7. Digital Audio Cards

The CAPS 2 radio automation system can work with any kind of digital audio card that is supported by the Windows operating system as an audio device and which can be accessed by a user application. After installation of the digital audio card, check the Sounds and Multimedia section of the Control Panel (bookmark "Audio"). If it indicates that the card is installed, then you can count on the application working with this card with high probability. Nevertheless, they're a lot of specific details and nuances with various digital audio cards from different manufacturers. These nuances can be discovered at the most inappropriate moments, so we recommend studying this part attentively.

As long as the manufacturer does provide a qualified and reliable ASIO driver for his audio cards the CAPS 2 System has no limitations to work with the selected cards.

In the following an overview is given for the manufacturers based on made experiences

7.1 DIGIGRAM

DIGIGRAM is a well-known French company that designs and manufactures digital audio cards for radio broadcasting and radio production. DIGIGRAM cards are most widely used in the European radio industry. DIGIGRAM provides API, which makes it possible for other companies to use the internal capabilities of its cards.

DIGIGRAM provides a wide choice of digital audio cards. They can be used on any type of workstation. The high quality mixer in VX-series cards allows you to use them at retransmission radio stations.

7.2 Marian

The product range of audio cards Marian has developed to a wide range of adequate audio cards since CAPS made the first approach to use the Marc X card for Applications in the broadcast industry.

The meanwhile developed spate of TRACE cards from Marian with balanced analog In- and Outputs and or AES/EBU IN-and Outputs provide a perfect opportunity to

equip all different type of workstations with the adequate solution for the for the type of application it is determined for, just using one Brand of audio cards with a very good relationship between price and quality.

All cards have DSP power on board allowing level control and on board mixing. Ideal for multi channel play out with remote controlled level control and cross-fading.

Marian does provide API support

Positive points:

Good price/quality ratio

Availability of digital inputs and outputs (SPDIF optical and coaxial, ADAT).

For the Marc X card for multi channel playout in conjunction with the Marian ADCON breakout box

7.3 RME

This German company designs and manufactures digital audio cards of good studio quality. The main product is the Hammerfall series of multichannel (up to 56) cards. For the radio broadcast industry, DIGI96/8 cards (PST and PAD) can be used, as well as Hammerfall DSP. The cards feature analogue input/output, coaxial and optical SPDIF, ADAT, and may be used at editing, planning, on-air workstations. Due to digital I/O, they can be used in a studio with a digital mixing console.

Positive points:

High quality audio and high hardware reliability

Good driver quality

Advanced interfaces

Good price/quality ratio

7.4 Lynx

Lynx provides mult-ichannel professional cards with mostly digital I/O of good quality. Their cards can be used for radio broadcasting. We primarily recommend Lynx AES 16 and Lynx L22.

7.5 Creative Labs

This manufacturer is probably the best-known in the world. Their cards feature good quality and reliability, but at the consumer level. During recent years, they have introduced several series of cards for the consumer market: SBLive, SB Audigy, SB Audigy 2 and SB Extigy. SBLive can be used for the pre-listening system at any working place. It can also be used at Logger workstations, due to possibility of installing several cards in one computer (the last version of drivers supports multi card modes). Audigy cards can be used on simple editing workstations and simple musical editor workstations.

7.6 Yellowtec

In such cases where the given circumstances will make it preferable not to install an extra audio card inside the computer the USB audio interface box PUC 2 from the German company Yellowtec is a perfect and suitable alternative:

7.7 M-Audio

Recognized around the world as the top choice in host-based PCI digital audio solutions, the rack-mount Delta 1010 is designed to handle the needs of the professional broadcast system. The Delta 1010LT delivers much of the same universal connectivity, high fidelity and seamless performance as the popular Delta 1010 on a single PCI card—and at a fraction of the price. Multiple analog I/O, MIDI, S/PDIF and surround sound support are all here. Two inputs even have mic/line preamps on XLR connectors, saving the expense of outboard preamps. It's all on a compact, half-size PCI card with two color-coded breakout cables..

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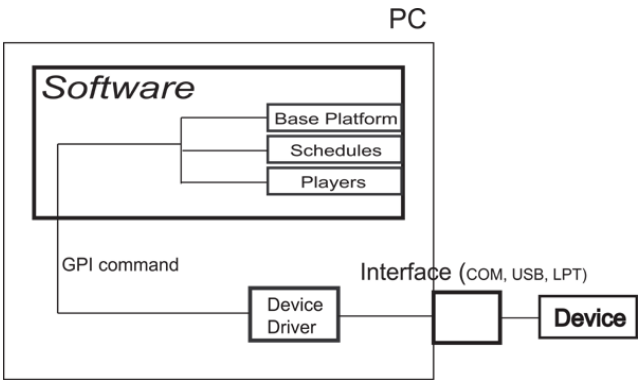
7.8 Remote Control

Remote control can be understood as the control of certain software modules (functions) of the radio broadcast system from external hardware devices – consoles, button fields etc.

There is a set of commands provided by remote control devices that can be interpreted by all virtual players and schedule modules (Fader start, Fader stop, PFL start, PFL stop). Some specific commands can be interpreted by certain players only. There is also a standard set of general commands that can be interpreted by the base platform of applications.

Commands are delivered to the computer with the help of the GPI (General Purpose Interface). Software modules that can interpret remote control commands may be configured for specific actions assigned to certain commands. Several remote control devices can be used simultaneously in one system.

The general block diagram of a remote control interface is presented below.



In order to provide remote control for a certain function, you have to connect the hardware remote control device, install drivers (if this is necessary), choose the configuration file describing the method of device initialization and data protocol (if needed) and assign GPI commands to system functions.

At present, we are using LPT, COM and USB interfaces to provide communication between the computer and the remote control device. LPT devices require a special driver that provides the generation of a remote command out of the contact closures on the LPT connector. COM port devices do not require a special driver, but each device needs a configuration file (cdu-file) describing the method of initialization of the device and data protocol. This file will be used by CAPS 2 applications. USB devices require a driver converting the external signal to a remote command and a cdu-file describing communication with the USB device.

All remote control devices can be classified as:

On-air consoles; each channel provides Fader-start/stop and PFL start/stop signals. They are usually connected to an LPT port. If the number of channels is more as can be covered by the limitation given by the LPT port , we use special hardware-extension modules that are connected to USB or COM ports.

Digital consoles. Usually, these are connected via COM with serial or FTP /ITP protocol and also the meanwhile widely common USB interface. They provide remote command on the depressing/holding/releasing of a button. Often, they are able to send fader-position data, including the Fader start/stop and PFL start/stop functions.

Button fields. These can be connected via a COM port. They feature sets of buttons oriented toward universal or specific functions. Usually depressing a button once results in a single remote command.

Most often these functions are used for remote control:

Playback start/stop of virtual players for Fader start/stop commands from a mixing console.

PFL start/stop from mixing console modules for the pre-listening of audio elements that are loaded into virtual players.

Jingle-machine control commands.

Schedule-navigation commands.

Start-point search-module commands.

Voice-track recording module.

Part of the CAPS 2 product line is the TP 314

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USB Interface converter with 8 GPI/O per unit available as a small aluminium Box with mounting bracket or as a slot mountable PC card for a PC slot position.

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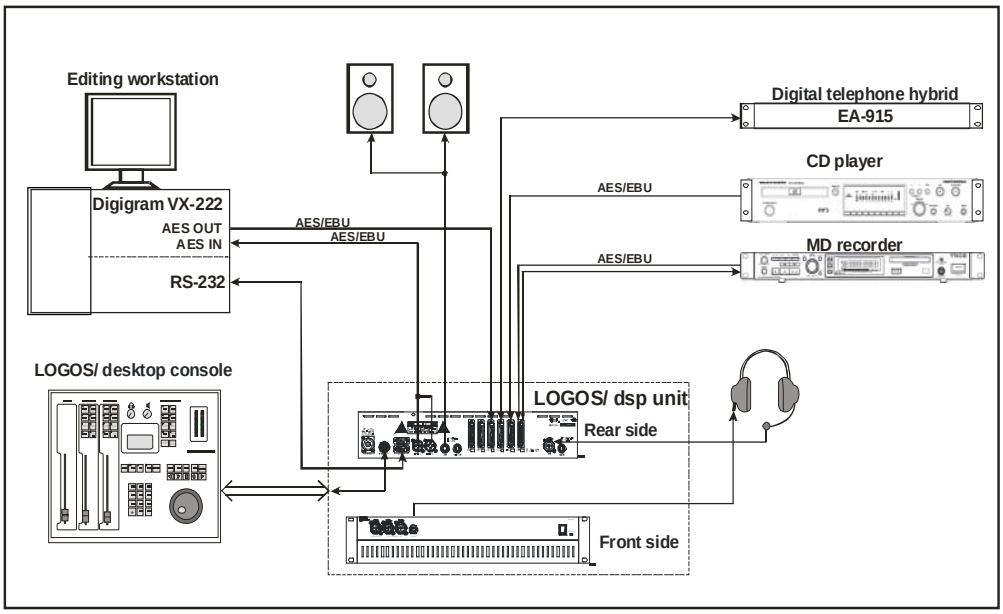
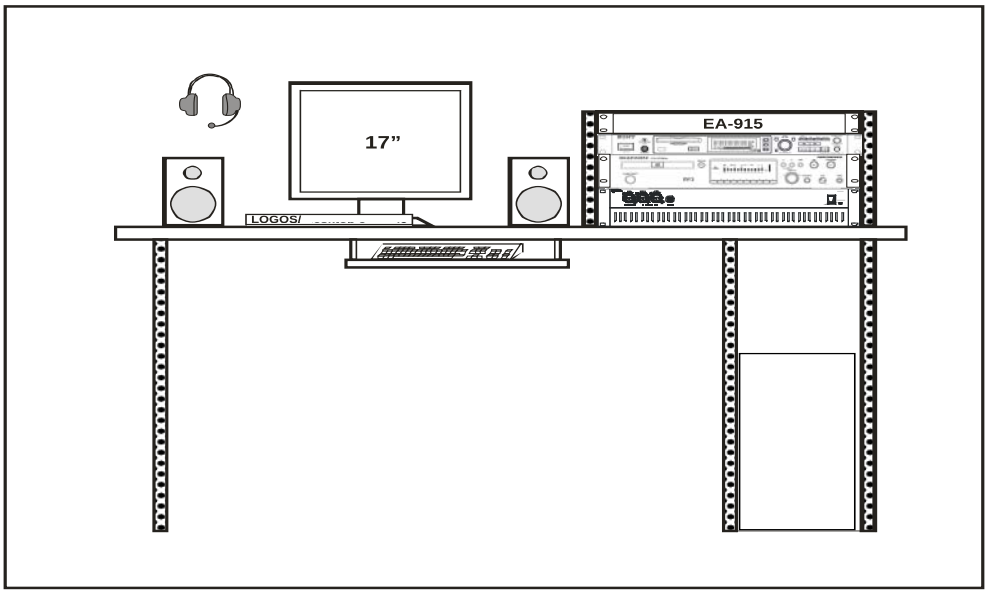
8. System Integration

8.1 LOGOS Mixer

The LOGOS mixer system consists of 2 parts: the console (remote control panel unit) and the rack unit (2U 19-inch rack with all audio connections). The console has all familiar audio and switching controls: faders, knobs, level indicators. It also has 8 assignable keys and a jog/shuttle wheel for the remote control of the digital audio workstation. The console also has a set of numeric keys for the manual dialing of hybrids and codecs and LCD display. All audio schematics and connectors are kept inside the rack unit.



Block diagram of journalist's working place with LOGOS



Radio journalist's working place with LOGOS mixer

The console has 3 faders. The left fader is always the main microphone channel. This channel has a built-in Radio journalist's working place with limiter / compressor. Two other faders correspond to line channels. Above each of the 2 line-channel faders there are 8 pushbuttons with LED indicators for input-source selection. A source will immediately be assigned to a closed fader and only accepted when the other fader does not select that source. Pre-selection can be Block diagram of journalist's done by an open fader. working place based on LOGOS Then, the newly selected source is pre-selected. Upon closing the fader, the newly selected source will become active on that channel.
A maximum of 6 input/output (analogue or digital) modules can be plugged into the rack unit. Inputs are always combined with outputs on the one multi-pin connector on the board. Also signaling, fader start/stop is present on this DB25 connector. The front panel of the rack unit has 2 audio inputs: one digital AES input and one analogue stereo input for the operative connection of any kind of journalist recording device. The rack unit has an external meter output, loudspeaker outputs, main output, a 9-pole sub-D connector with a number of input and output general-purpose signals (e.g. for ON

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AIR red light or cough button), and an RS232 connector for communication with PC.
Logos can help journalists to prepare materials for on-air delivery: the re-recording of source-report materials to the workstation, the recording of voice commentaries and guest interviews. Logos can also control the functions of the digital audio-editing workstation that allows the operator to use traditional controls, rather than a computer mouse and keyboard.

Journalist workstation on the base of EELA AUDIO mixer / switcher LOGOS.
The main tasks that can be carried out at this spot are the recording, editing and pre-production of audio items to be used later on-air. This workstation can be used either as a little stand-alone studio or as a part of a radio broadcast complex.
The main feature of this workstation is its compact mixing console and LOGOS switcher, which can provide for the easy handling of several signal sources, including remote-control functions and operations of the digital editing workstation.

Audio handling:
Non-destructive non-linear multichannel editing, voice-track recording, telephone-interview recording, and the use of external CD and MD sources. If this workstation is used as a part of radio broadcast complex, it can provide additional functions: editing and adding material to a database (musical, commercial, news). It is also possible to deliver material on air from this workstation place.
All sources and the digital audio-editing workstation are connected to the LOGOS rack unit via the AES/EBU interface.

Text handling:
Acquisition, selection, compilation, typing, printing of text. Text can be associated with the schedule elements for displaying it at the moderator screen of the on-air workstation at the appropriate time.

Text and audio handling:
Creating of text files from audio items. Reading of text passages from a computer screen and voice recording on a PC HDD from a microphone input.
It is possible to connect 2 additional stationary audio sources with digital or analogue inputs/outputs and 2 temporary sources with digital and analogue inputs/outputs. Connectors for temporary sources are located at the front panel of the LOGOS rack unit.
All equipment is located in a technical furniture set, including table 19 inch rack 6U.

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Code	Description	Manufacturer	Quanti ty
Editing workstation			
BCS editor	Software application BCS editor (DB)	DIGISPOT SYSTEM GMBH	1
	Personal computer		1
VX-222	Digital audio card DIGIGRAM VX-222	DIGIGRAM	1
LOGOS	Mixer / switcher LOGOS	Eela Audio	1
DT-290	Headset DT-290	Beyerdynamic	1
MDS-E12	MD recorder 19" 1U, I/O RCA and XLR, AES/EBU, fader start	Sony	1
PMD 325	CD player 19" 2U, outputs XLR, fader start, MP3, Pitch Control, CD-RW, CD Text, instant start	Marantz	1
EA-915/x	Digital telephone hybrid	Eela Audio	1
TR-A	Active acoustic monitor	TRACT	2
Technical furniture and cabling			
Furniture	Computer table + mains extender	EA Broadcast	1
Cabling	Complete set of cables. Neutrik connectors. All cables are marked.	EA Broadcast	1

Specification on the working place for a radio journalist based on LOGOS

8.2 Production Block based on the EELA AUDIO S130 Mixing Console

A production block can be used for the production of musical and voice programs and commercials, the non-linear editing and processing of audio items, and the filling in of musical database. It can be used either as a stand-alone block or as part of a radio broadcasting complex. In the latter instance, it can be used as an on-air reserve block.

The production block consists of a control room and studio.

Control room

Sources:

CD player

CD recorder (embedded in the digital audio editing station)

MD recorder

TAPE recorder

Processing devices:

Effect processor – allows you to add various audio effects during recording and production.

4-channel compressor/limiter is used during voice recording.

Audio handling:

Non-destructive non-linear multichannel editing, voice track recording, telephone interview recording, and the use of external CD and MD sources. If this workstation is used as a part of a radio broadcast complex, it can provide additional functions: the editing and addition of material to the database (music, commercials, news). It is also possible to deliver material on air from this workstation.

All sources and digital audio editing workstations are connected to the LOGOS rack unit via the AES/EBU interface.

Text handling:

Acquisition, selection, compilation, typing, and printing of text. Text can be associated with schedule elements for displaying it on the moderator screen of the on-air workstation at the appropriate time.

Text and audio handling:

Creating of text files from audio items. Reading of text passages from a computer screen and voice recording on a PC HDD from a microphone input.

Signaling:

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The production block uses 2 red-light units. It is also possible to use one more red-light unit. The functionality and logic of red-light units can be adjusted by the user according to his or her needs.

8.3 mixing console layout (18 module chassis)

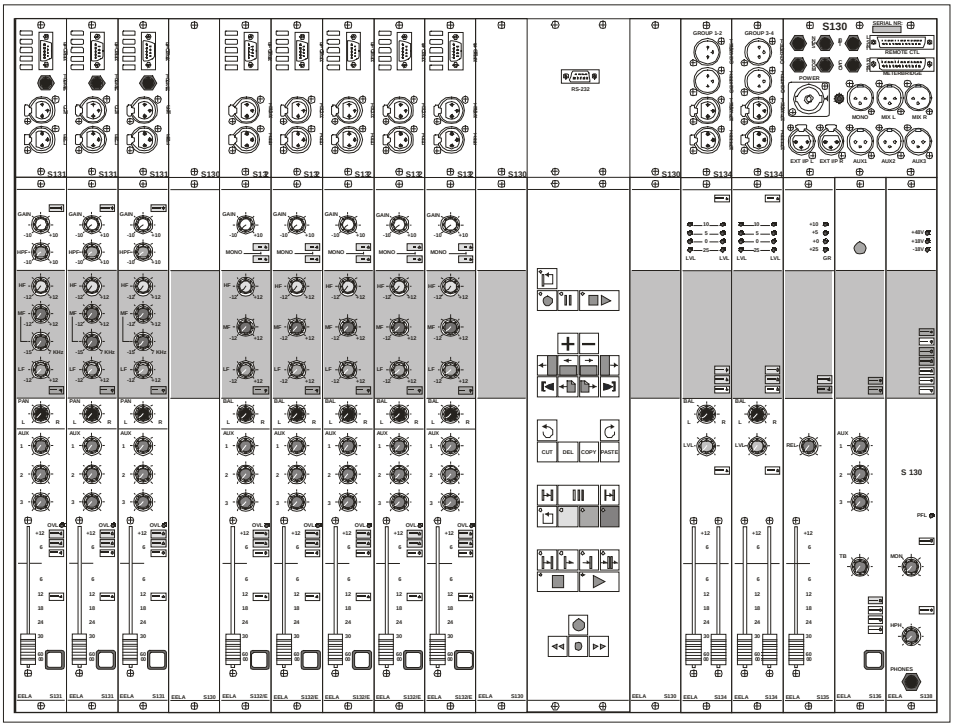
Mixing console configuration:

18 module-section chassis (width - 720 mm)

S131 – 3 pcs. – MIC/LINE input channel;

S132E - 5 pcs – Stereo LINE input with equalizer;

S134 – 2 pcs. – Group OUTPUT with high-level return;



S135 – 1 pcs. – Master OUTPUT with compressor limiter;

S136 – 1 pcs. – Auxiliary / Oscillator / Talkback;

S138 – 1 pcs. – Monitor module;

S130 – 3 pcs. – blank panel

A special remote-control device is embedded in the console. This unit can be used for the remote control of the digital audio workstation.

The mixer features 3 blank spaces, so it can be used later for further extensions.

One of the S132/E modules is for reserve and is not included in the typical configuration of the workstation. This module can be used for the connection of auxiliary sources, such as tape recorders. In this case, this workstation can also be used for the digitizing of old tape libraries.

The power unit of mixing console is maintained in a separate, 19” rack unit.

All equipment is displaced in technical furniture including table 19” rack 9U and floor 19” rack 6U.

8.4 Studio

Studio equipment includes 3 microphones, 3 sets of headphones, acoustic monitors (automatically muted when the microphone channel is opened) and a MIC LIVE red-light unit. The EA853 studio interface, which is also displaced in the studio, features cough control and a mic-live indicator.

The studio can be used for recording musical and talk programs with the participation of a number of guests, as well as the production of commercials.

The studio and control room are connected by intercom, allowing for communicate between the operator and guests without it being part of the on-air program.

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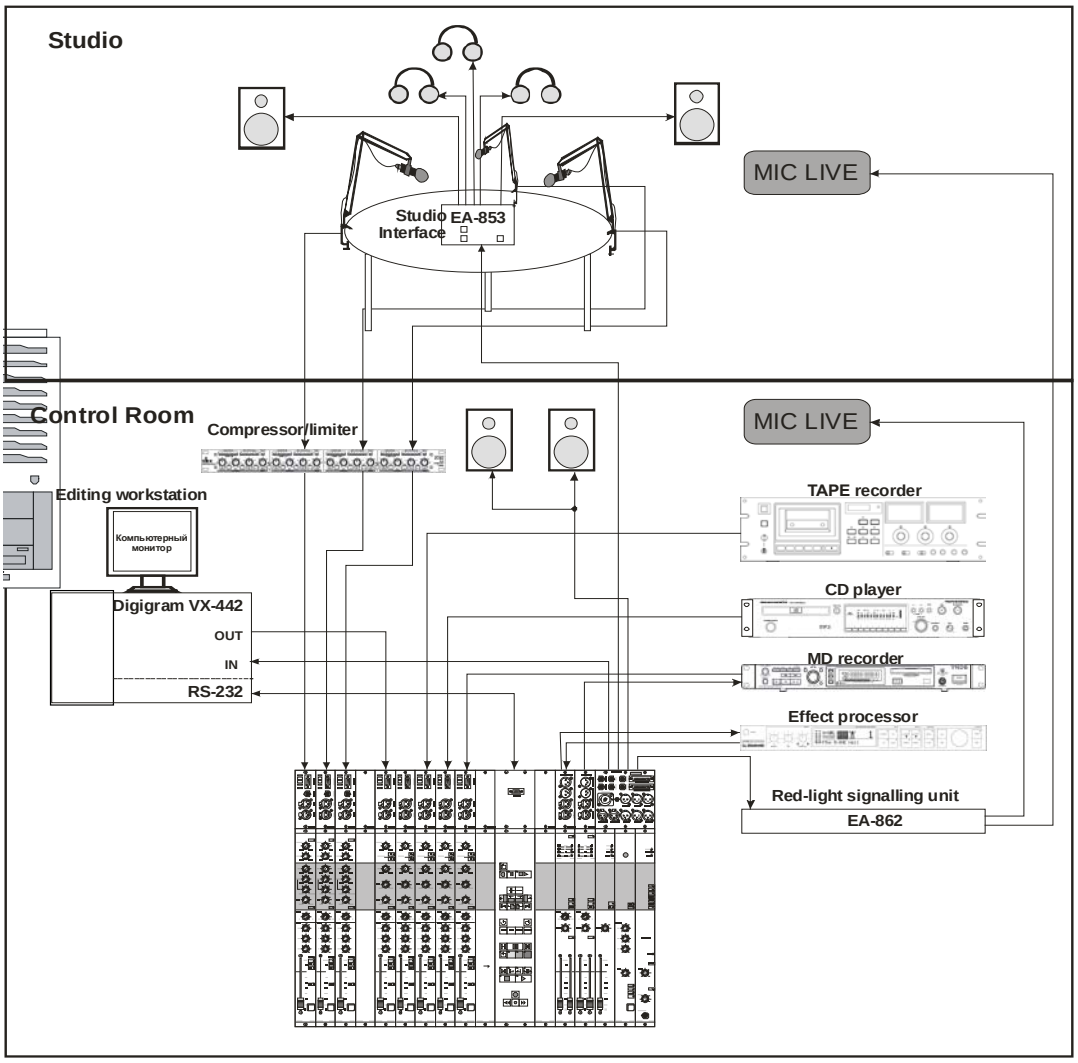
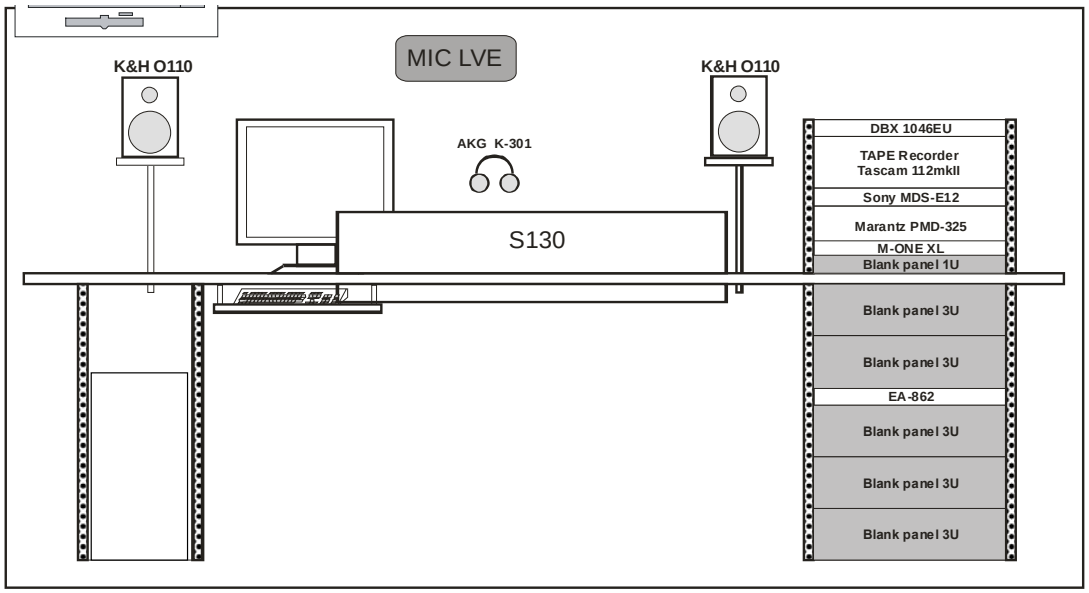


Block diagram of production block based on S130



Control room layout of the production block

8.5 Specifications for the production studio on the base of S130 mixing console

Code	Description	Manufacturer	Q-ty
Mixing console			
S130	Mixing console	Eela Audio	1
Editing workstation			
BCS Editor	Software application BCS Editor (DB)	CAPS 2 BASIC	1
VX-222	Digital audio card DIGIGRAM VX-222	Digigram	1
PC	Personal computer		1
Sources			
PMD 325	CD player 19" 2U, outputs XLR, fader start, Pitch Control, CD-RW, CD Text, instant start	Marantz	1
MDS-E12	MD recorder 19" 1U, inputs/outputs RCA and XLR, fader start	Sony	1
112 MK II	Cassette tape recorder, 19" 3U PRO, fader start	Tascam	1
Processing devices			
M-ONE XL	Effect processor	TC electronic	1
Microphone group			
1046-EU	4 channel compressor/limiter	DBX	1
Acoustic monitors			
O 110	Active acoustic monitors	Klein&Hummel	2
Other equipment			
EA862	Red-light control unit	Eela Audio	1
Red light unit	MIC LIVE red-light unit	EA Broadcast	2
Technical furniture and cabling			
Furniture	Technical table with RACKs. The mixing console is embedded in the table. Mains extensions.	EA Broadcast	1
Cable Set	Complete set of cables: audio, signaling, control cables. Neutrik connectors. All cables are marked.	EA Broadcast	1
Voice Studio			
Microphone group			
SM7	Dynamic studio microphone , cardioid	Shure	3
	Pantograph – microphone support. Circular zone 1,200 mm	Canford	3
EA853	Studio interface	Eela Audio	1
Acoustic monitoring			
K240DF	Headphones "Studio Monitor"	AKG	3
Technical furniture and cabling			
	Moderator table	EA Broadcast	1
Cable set	Complete set of cables: audio, signaling, control cables. Neutrik connectors. All cables are marked.	EA Broadcast	1

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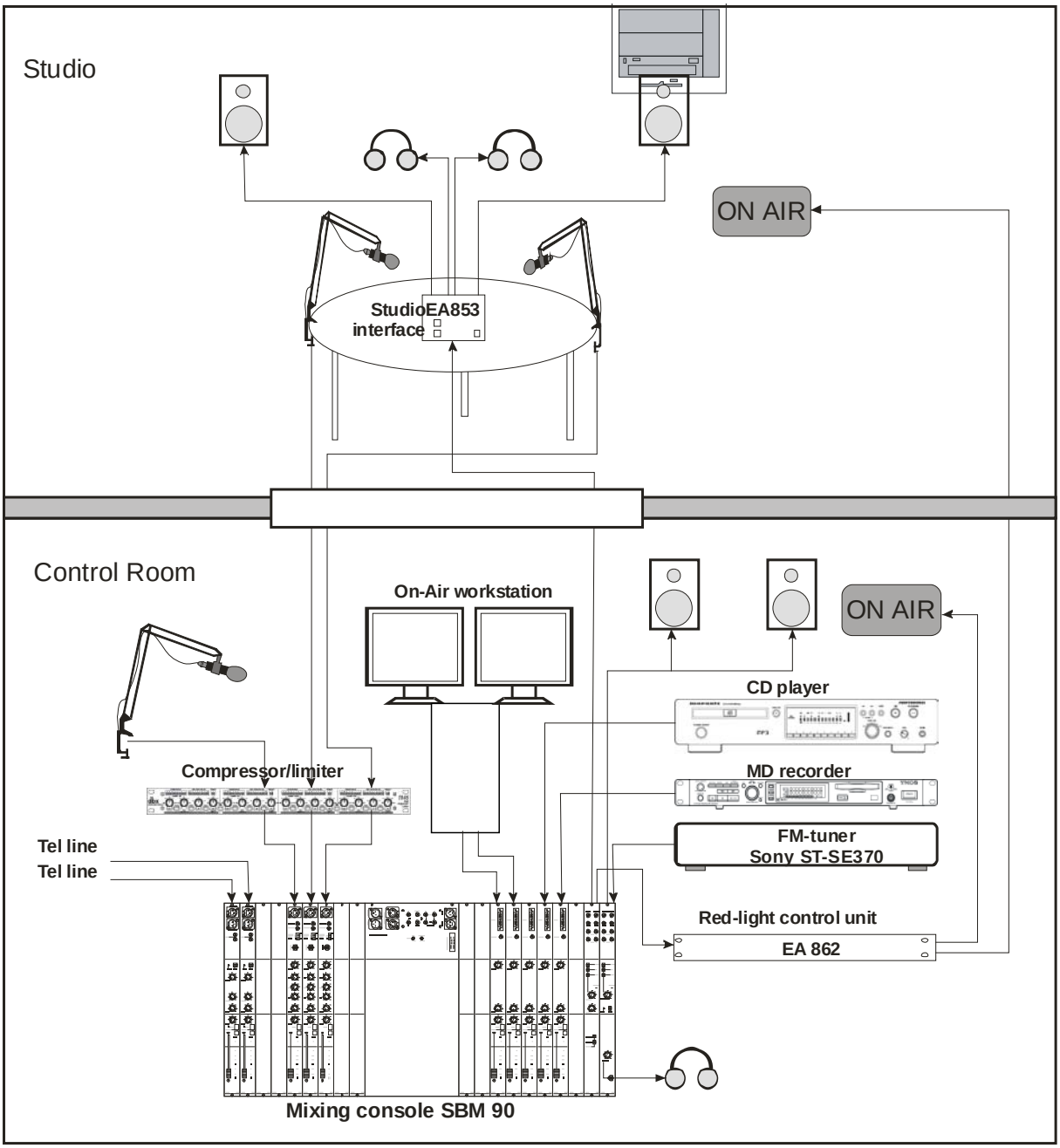
8.6 On-air Block on the Base of the SBM90 Mixing Console

The on-air block on the base of SBM90 mixing console includes an on-air control room and voice studio.

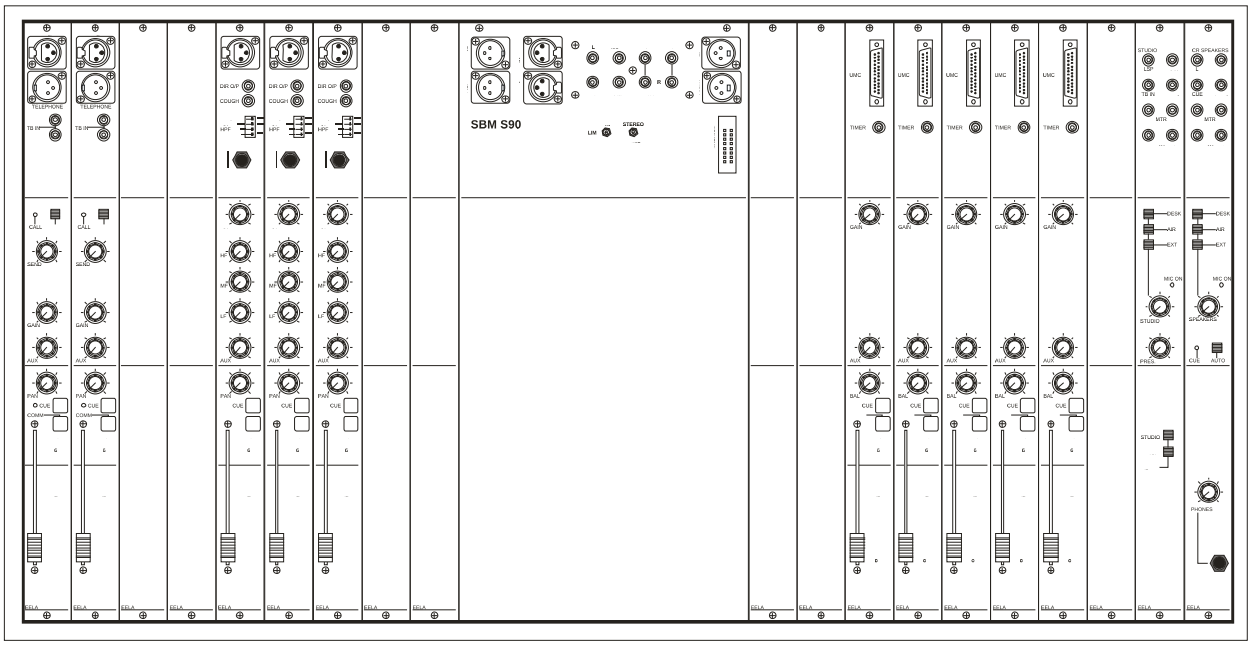
On-air control room on the base of the SBM90 mixing console.

This is a good solution for an on-air control room for a medium-sized private radio station. The control room is based upon an on-air SBM90 mixing console from Eela Audio and the CAPS 2 radio-automation system from EA Broadcast Hamburg .

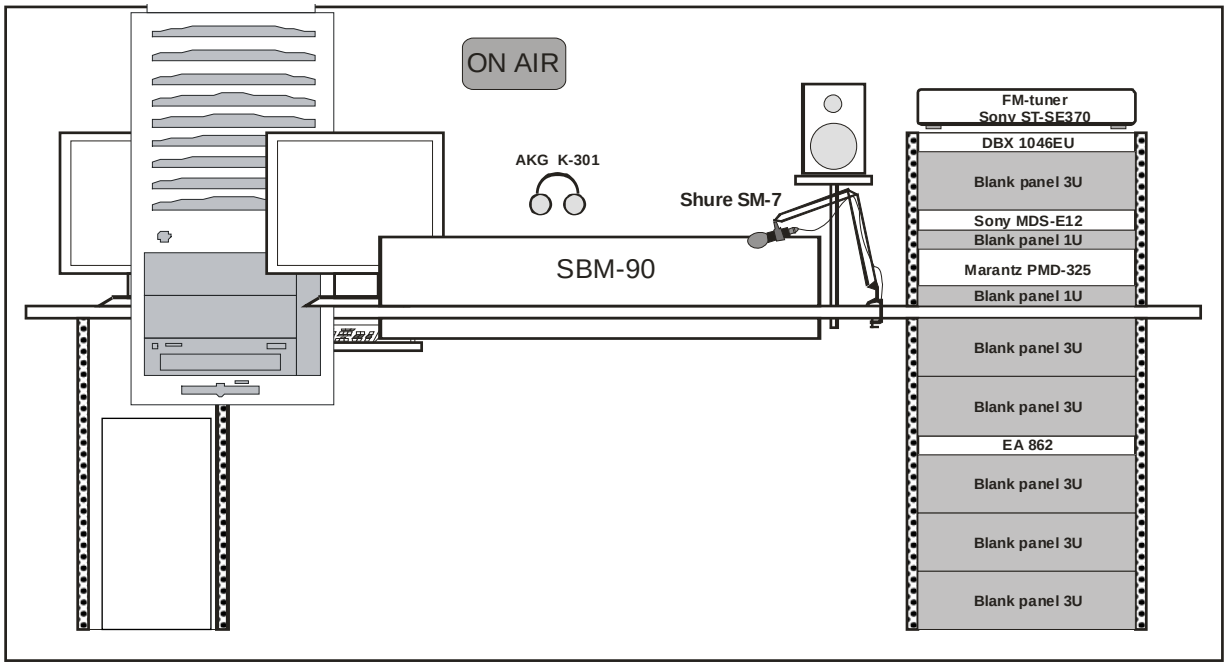
On-air can be provided in manual and automatic modes of operation. It is possible to use the control room as a stand-alone block of equipment or as a part of radio-broadcasting complex.



Block diagram of on-air block on the base of the SBM90 mixing console



The layout of EELA AUDIO SBM90 mixing console (chassis with 25 modules)



On-air control room layout

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8.7 Specification of an on-air block, based upon an SBM90 mixing console

Code	Description	Manufacturer	Quantity
On-air mixing console			
SBM90	On-air radio mixing console	Eela Audio	1
On-air workstation			
DJIN	On-air workstation DJIN. Set of different configurations. Works on Windows NT/2000 operating system.	CAPS 2 BASIC	1
Trace Pro	Professional digital audio card. Two inputs / outputs.	Marian	1
PC	Personal computer	On Customer Preferences	1
Sources			
PMD 325	CD player 19" 2U, outputs XLR, fader start, MP3, Pitch Control, CD-RW, CD Text, instant start	Marantz	1
MDS-E12	MD recorder 19" 1U, inputs/outputs RCA и XLR, fader start	Sony	1
Microphone group			
SM7	Studio Microphone dynamical cardioid	Shure	1
	Pantograph – microphone support. Circular zone 1,200 mm	MICA	1
1046-EU	4-channel compressor / limiter	DBX	1
Acoustic monitoring			
TR-A	Active acoustic monitor	TRACT	2
K 301	Headphones	AKG	1
ST-SE 370	Tuner FM - stereo (for monitoring)	Sony	1
Other equipment			
EA 862	Red-light control unit	Eela Audio	1
Red light	MIC LIVE red-light unit	Canford	2
Technical furniture and cabling			
Furniture	Technical table with RACKs and mains extensions	EA Broadcast	1
Cable Set	Complete set of cables: audio, signaling, control cables. Neutrik connectors. All cables are marked.	EA Broadcast	1
Voice studio			
Microphone group			
SM7	Studio Microphone dynamical cardioid	Shure	2
	Pantograph – microphone support. Circular zone 1200 mm	Canford	2
EA 853	Studio interface	Eela Audio	1
Acoustic mopnitoring			
K240DF	Headphones "Studio Monitor"	AKG	2
Technical furniture and cabling			
	Moderator table	EA Broadcast	1
Cable STUDIO	Complete set of cables: audio, signaling, control cables. Neutrik connectors. All cables are marked.	EA Broadcast	1

Copyright: DIGISPOT SYSTEM GMBH

The control room provides: on-air delivery of radio programming from the on-air broadcasting workstation, CD-player, MD recorder. All sources have remote start facilities.

Due to a free-line stereo input in the mixing console, you can connect any external source (eg., the output of the production block or a journalist's works station).

Two telephone hybrids provide the ability to organize telephone contests with the participation of 2 listeners.

Microphone group

Microphone placement (one in the control room and the second in the studio) provides the ability to work either with the studio or without. All microphones are connected to a 4-channel compressor/limiter.

Specification of an on-air block based upon an SBM90 mixing console

Monitoring and signaling

Two «MIC LIVE» red-light units are provided. Red lights are connected to the EA-863 red-light control unit. The EA-863 has a 3rd output, which provides the ability for future expansion. The logic of red-light functionality is defined by the user.

Visual indication of the audio level is provided by the LED level indicator located in the upper part of the SBM90 mixing desk.

Acoustic monitoring is provided through acoustic monitors and headphones. It is possible to monitor radio-station output using an FM tuner. Pre-listening functions are provided at the on-air workstation as well.

Mixing console's configuration:

S91 – 3 pcs. – Microphone inputs;

S92 - 5 pcs. – stereo line input modules;

S93 – 2 pcs. – telephone modules;

S97 – 1 pcs. – Control room monitor module;

S98 – 1 pcs. – Studio monitor module

S90/1 – 7 pcs. – blank panels

Future expansion of the mixing console is possible due to 7 free spaces in the mixer chassis.

The power supply for the mixing console is built into a separate 19" rack.

All equipment is displaced in technical furniture (see picture), including table 19" rack 9U and floor 19" rack 16U.

On-air studio

The on-air studio has 2 microphones, 2 headphone sets, acoustic monitors (automatically muted when the microphone channel is opened) and a MIC LIVE red-light unit. The EA853 studio interface also installed in the studio features cough control and an open-mic indicator.

The studio can be used for programs involving the participation of several guests, located in the studio, while the presenter works from the control room. It is also possible to work with the operator in the control room and the presenter in the studio.

The studio and control room are connected by an intercom allowing for off-air communication between the operator and guests.

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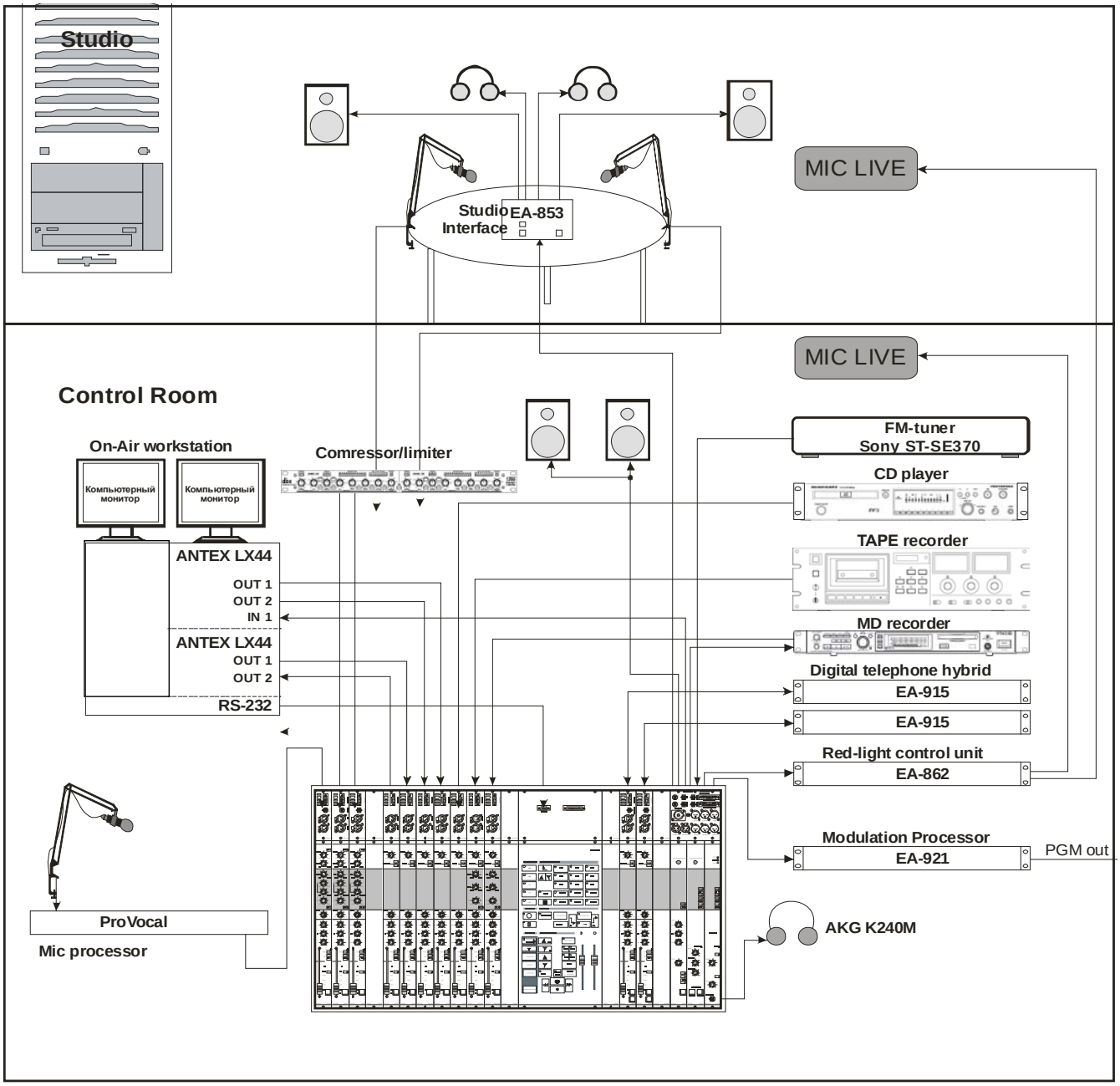
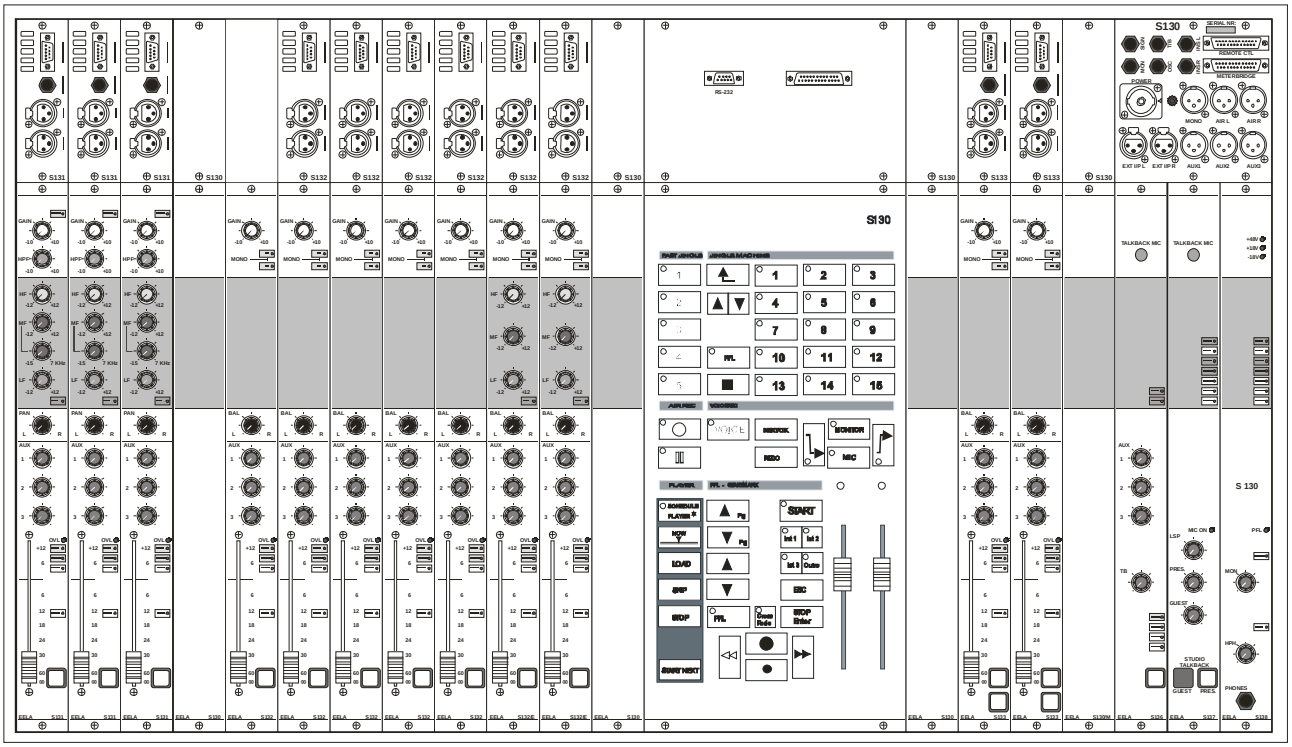
8.8 On-air Studio set up based on the S130 Mixing Console

On-air block consists of control room and studio.

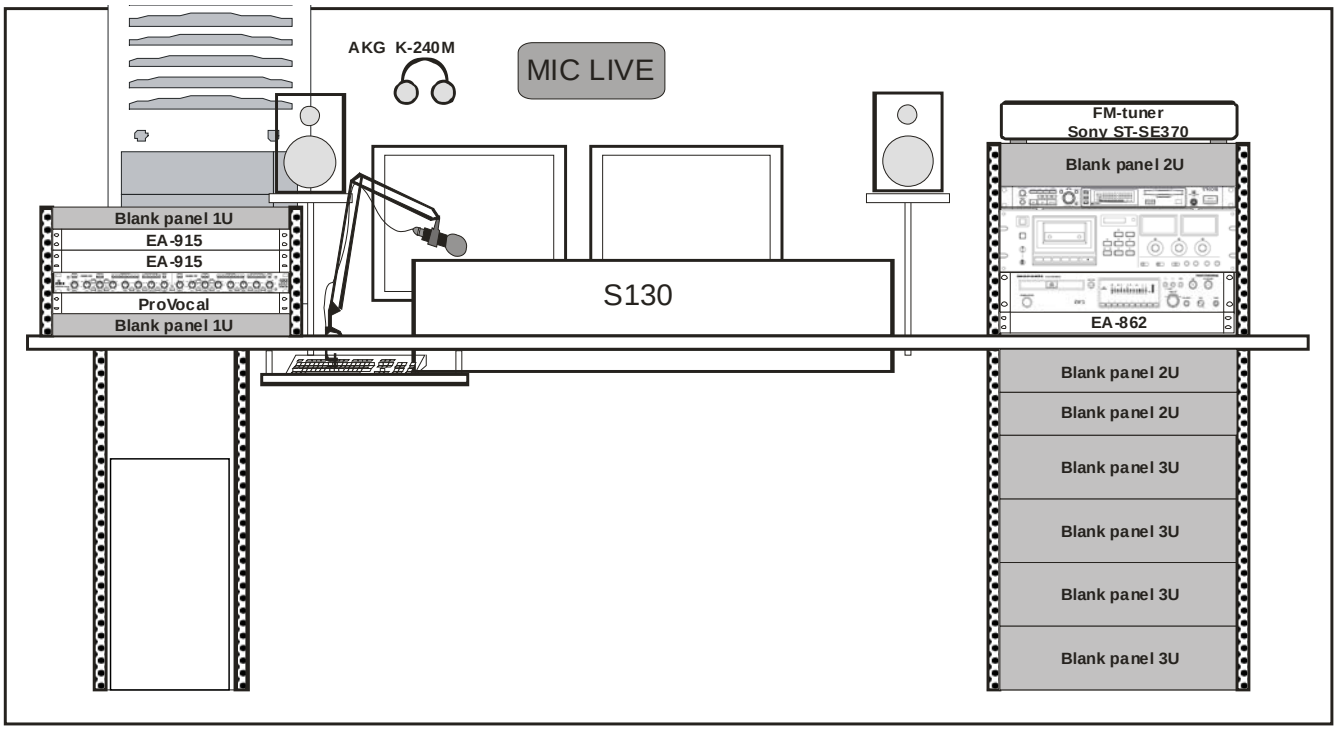
Control room
The control room provides: on-air delivery of radio programming from an on-air broadcasting workstation (4 stereo channels), CD-player, MD recorder, tape sources. It can provide for the organization of telephone contests with the participation of 2 listeners. It is also possible to record voice tracks and record material from one media to another.



Block diagram of an on-air block based on S130 mixing console



Mixing console S130 layout in chassis 25 modules



The layout of control room equipment

copyright: DIGISPOT SYSTEM GMBH

When not on-air, the control room can be used for filling in the database or for the production of music and talk programs. Schedule control is also possible.

All sources, including the on-air workstation, have remote control and pre-listening facilities.

Monitoring and signaling

Three MIC LIVE red-light units are provided. Red lights are connected to the EA-863 red-light control unit. Red lights are usually installed in the studio, control room and above the door to the broadcast block. The logic of red-light functionality is defined by the user.

A visual indicator of the audio level is provided by an LED level indicator located in the upper part of the mixing desk.

Acoustic monitoring is provided by acoustic monitors and headphones. It is Also possible to monitor radio station output using an FM tuner. Pre-listening functions are provided at the on-air workstation as well.

Processing

The processing of the audio signal is carried out by means of a 2-channel compressor / limiter (for studio microphones) and microphone processor in the control room. The main output signal is fed to the FM processor, which is hooked up ahead of the transmitter.

Mixing console configuration:

24 module sections chassis (width - 960 mm)

S131 – 3 pcs. – MIC/LINE input channel;

S132 - 5 pcs – Stereo LINE input without equalizer;

S132E - 5 pcs – Stereo LINE input with equalizer;

S133 – 2 pcs – Telephone input/output module;

S136 – 1 pcs. – Auxiliary / Oscillator / Talkback;

S137 – 1 pcs. – Studio monitor module;

S138 – 1 pcs. – Monitor module;

S130/M – 1 pcs – master module;

S130 – 3 pcs. – blank panel

A meterbridge for the console features:

EA609 – 1 pcs. – Dual LED PPM meter;

EA704 – 1 pcs. – PFL speaker;

EA709 – 1 pcs. – Dual LED PPM meter;

EA717/1 – 1 pcs. – Clock/timer module (2U)

A special remote-control device is embedded in the console. This unit can be used for the remote control of the digital audio workstation.

The mixer features 3 blank spaces that can be used in future expansion.

All equipment in the on-air control room, except for the FM processor and the red-light unit, is mounted in a technical table in 3 racks: 3U and 6U – on table racks and a 16U floor rack.

The power unit of the mixing console is located in a separate 19” rack unit.

Studio

The on-air studio has 2 microphones, 2 pairs of headphones, acoustic monitors (automatically muted when the microphone channel is opened) and a MIC LIVE red-light unit. The EA853 studio interface, also located in the studio, features cough control and an open-mic indicator.

The studio can be used for programs involving several in-studio guests and a presenter in control room. It is also possible to have the operator in the control room and the presenter in the studio.

The studio and control room are connected with an intercom allowing for off-air communication between the operator and guests.

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Specification of an on-air block, based upon an S130 mixing console

Code	Description	Manufacturer	Q-ty
	Control room		
	On-air mixing console		
S130-BA	On-air mixing console S130	Eela Audio	1
	On-air workstation		
DJIN	On-air workstation DJIN. Set of different configurations. Works on Windows NT/2000 operating system.	CAPS BASIC	1
Trace Pro	Professional digital audio card. Two inputs / outputs.	Marian	2
PC	Personal computer		1
Remote control	On-air remote control panel embedded into S130	Eela Audio	1
	Sources		
EA 915	Digital telephone hybrid	Eela Audio	2
PMD 325	Professional CD player CD, CD-R, CD-RW and MP3	Marantz	1
112 MkII	Professional cassette tape recorder, 3 heads	Tascam	1
LA-112	Balanced I/O interface for MK 112	Tascam	1
	Microphone group		
SM7	Studio Microphone dynamical cardioid	Shure	1
23850.300.55	Pantograph – microphone support.	Konig & Mayer	1
1066	2 channel compressor/limiter/expander/gate	DBX	1
PROVOCAL-EU	Digital microphone processor	DBX	1
	Studio monitoring		
TR-A	Active acoustic monitor	TRACT	2
K240M	Headphones	AKG	1
ST-SE 370	Tuner FM - stereo (for monitoring)	Sony	1
	Other equipment		
EA-862	Indicator board's control unit	Eela Audio	1
Red light	Red light unit "MIC LIVE"	Eela Audio	3
EA-921	Modulation processor	Eela Audio	1
	Technological furniture and cabling		
Furniture	Technological furniture with RACKs and mains extenders. Mixing console is embedded into table.	EA Broadcast	1
Cable Set CR	Complete set of cables: audio, signaling, control cables. Neutrik connectors. All cables are marked.	EA Broadcast	1
	Voice studio		
	Microphone group		
C4500B	Microphone cardioid	AKG	2
	Pantograph, microphone support	MICA	2
EA-853	Studio interface	Eela Audio	1
	Acoustic monitoring		
K240DF	Headphones "Studio Monitor"	AKG	2
TR-A	Active acoustic monitor	TRACT	2
	Technical furniture and cabling		
Furniture	Presenter table	EA Broadcast	1
Cable Set ST	Complete set of cables for studio	EA Broadcast	1

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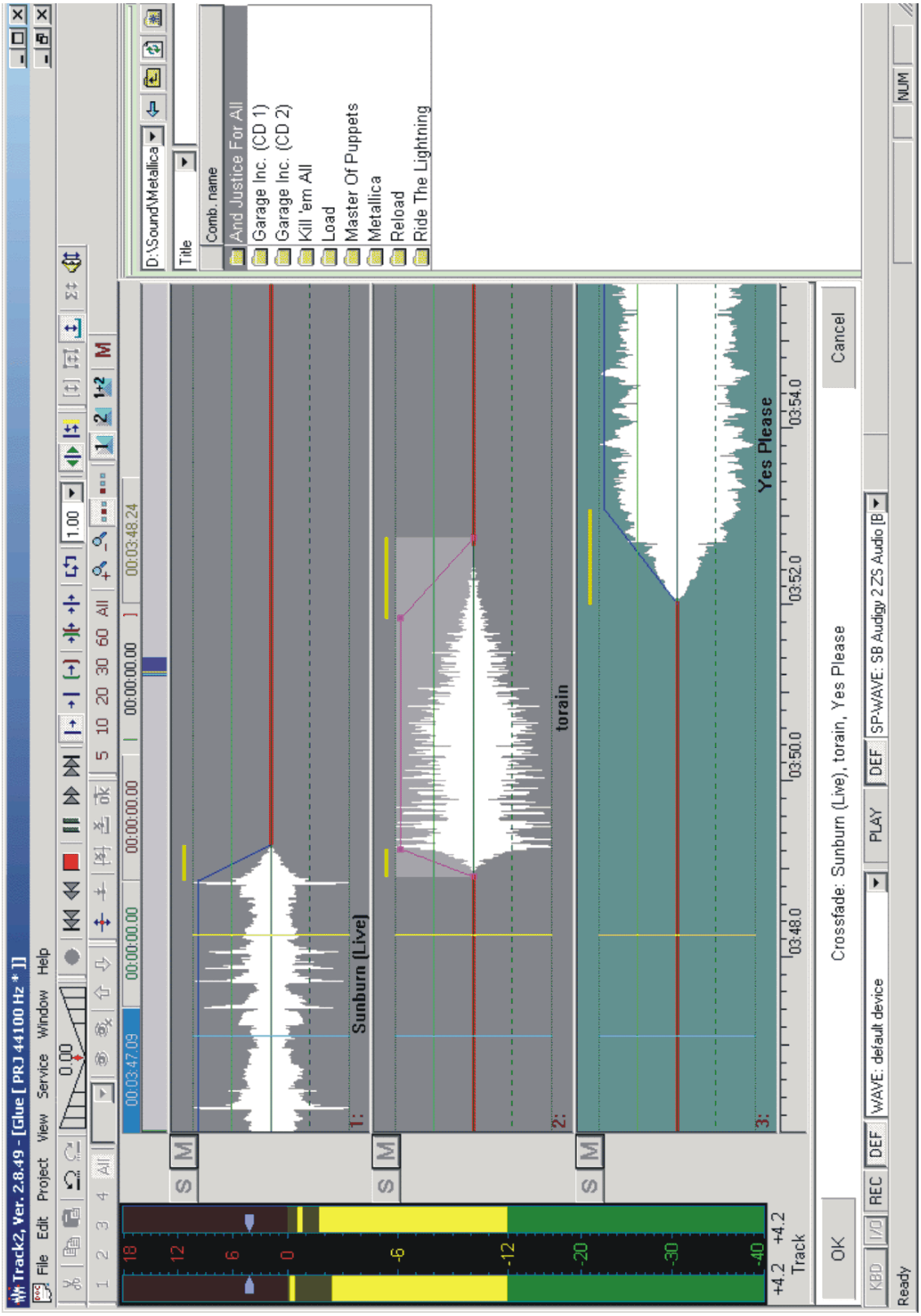
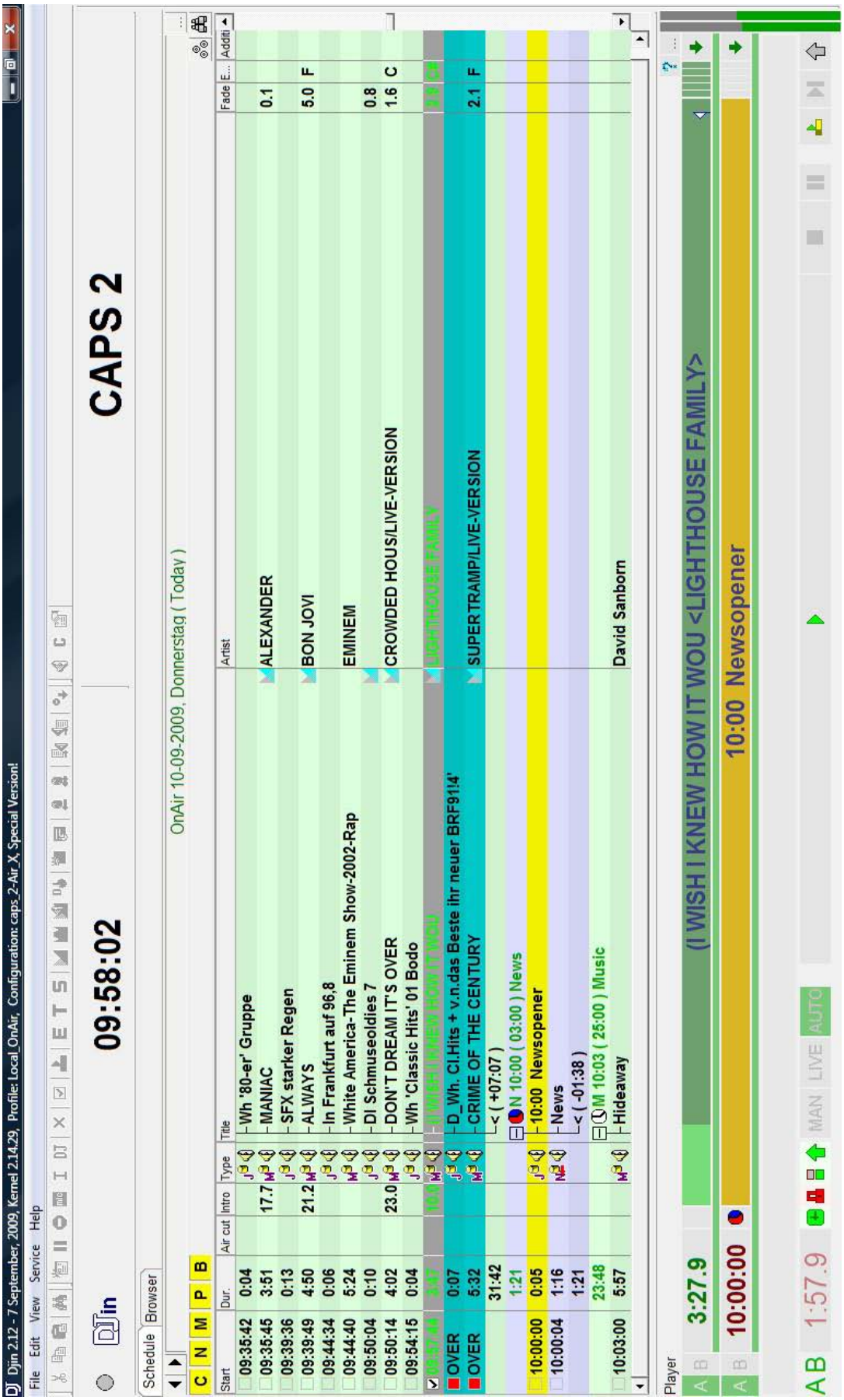
9. Typical Workstation Screenshots

BCS Editor Broadcast Audio Editing Station



ON-AIR Schedule including X-Track Player


Djin 2.12 - 7 September, 2009, Kernel 2.14.29, Profile: Local_OnAir, Configuration: caps_2-Air_X, Special Version!
File Edit View Service Help
09:58:02
CAPS 2
Schedule Browser
OnAir 10-09-2009, Donnerstag (Today)
C N M P B
Start Dur. Air cut Intro Type Title Artist Fade E... Additi
09:35:42 0:04 Wh '80-er' Gruppe
09:35:45 3:51 17.7 MANIAC ALEXANDER 0.1
09:39:36 0:13 SFX starker Regen
09:39:49 4:50 21.2 ALWAYS BON JOVI 5.0 F
09:44:34 0:06 In Frankfurt auf 96,8
09:44:40 5:24 White America-The Eminem Show-2002-Rap EMINEM 0.8
09:50:04 0:10 DI Schmuseoldies 7
09:50:14 4:02 23.0 DON'T DREAM IT'S OVER CROWDED HOUS/LIVE-VERSION 1.6 C
09:54:15 0:04 Wh 'Classic Hits' 01 Bodo
09:57:44 3:47 (I WISH I KNEW HOW IT WOU LIGHTHOUSE FAMILY 3.0 C
OVER 0:07 D_Wh. Cl.Hits + v.n.das Beste ihr neuer BRF914'
OVER 5:32 CRIME OF THE CENTURY SUPERTRAMP/LIVE-VERSION 2.1 F
31:42 < (+07:07)
1:21 N 10:00 (03:00) News
10:00:00 0:05 10:00 Newsopener
10:00:04 1:16 News
1:21 < (-01:38)
23:48 M 10:03 (25:00) Music
10:03:00 5:57 Hideaway David Sanborn
Player
A B 3:27.9 (I WISH I KNEW HOW IT WOU <LIGHTHOUSE FAMILY>
A B 10:00:00 10:00 Newsopener
A B 1:57.9 MAN LIVE AUTO

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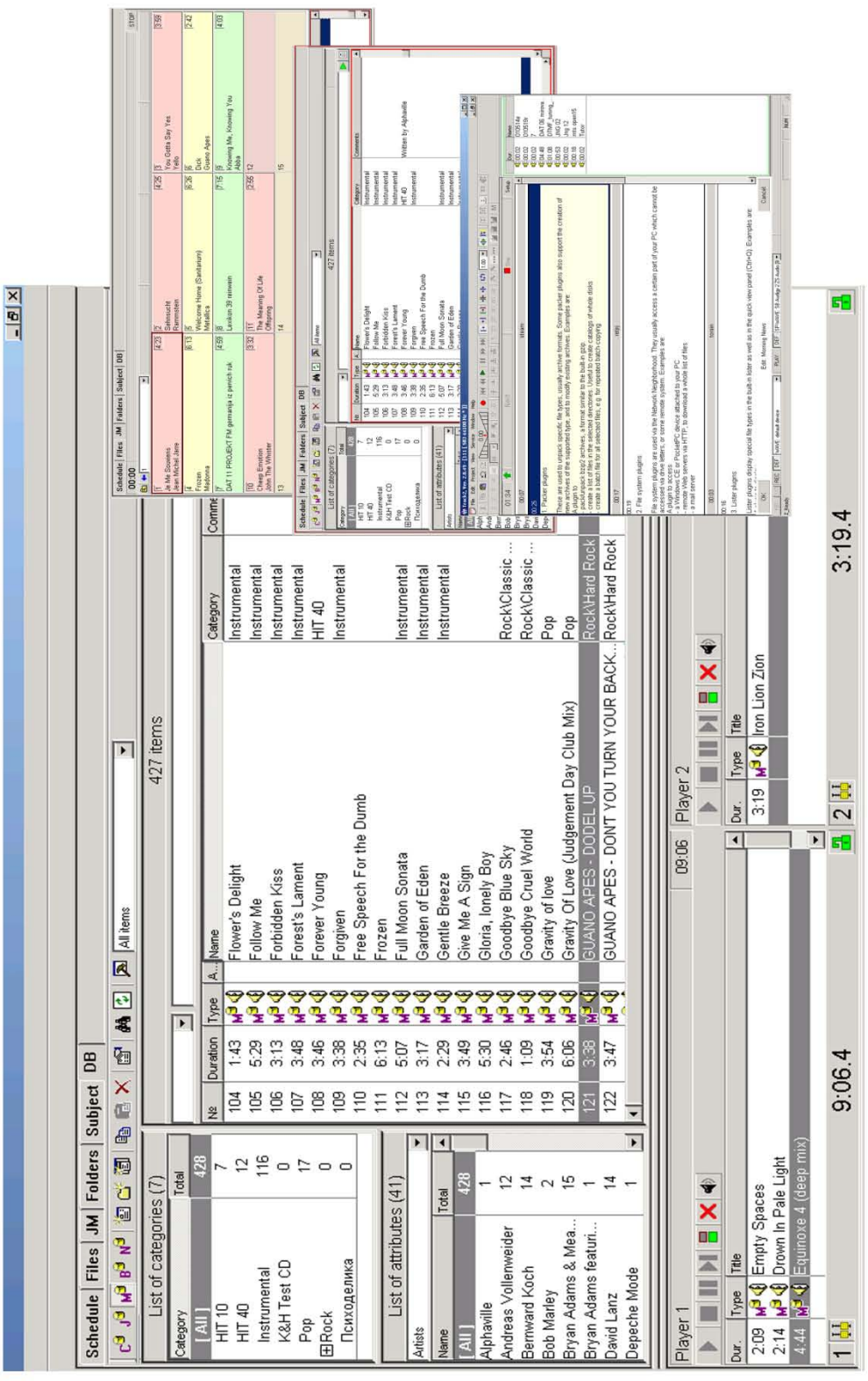
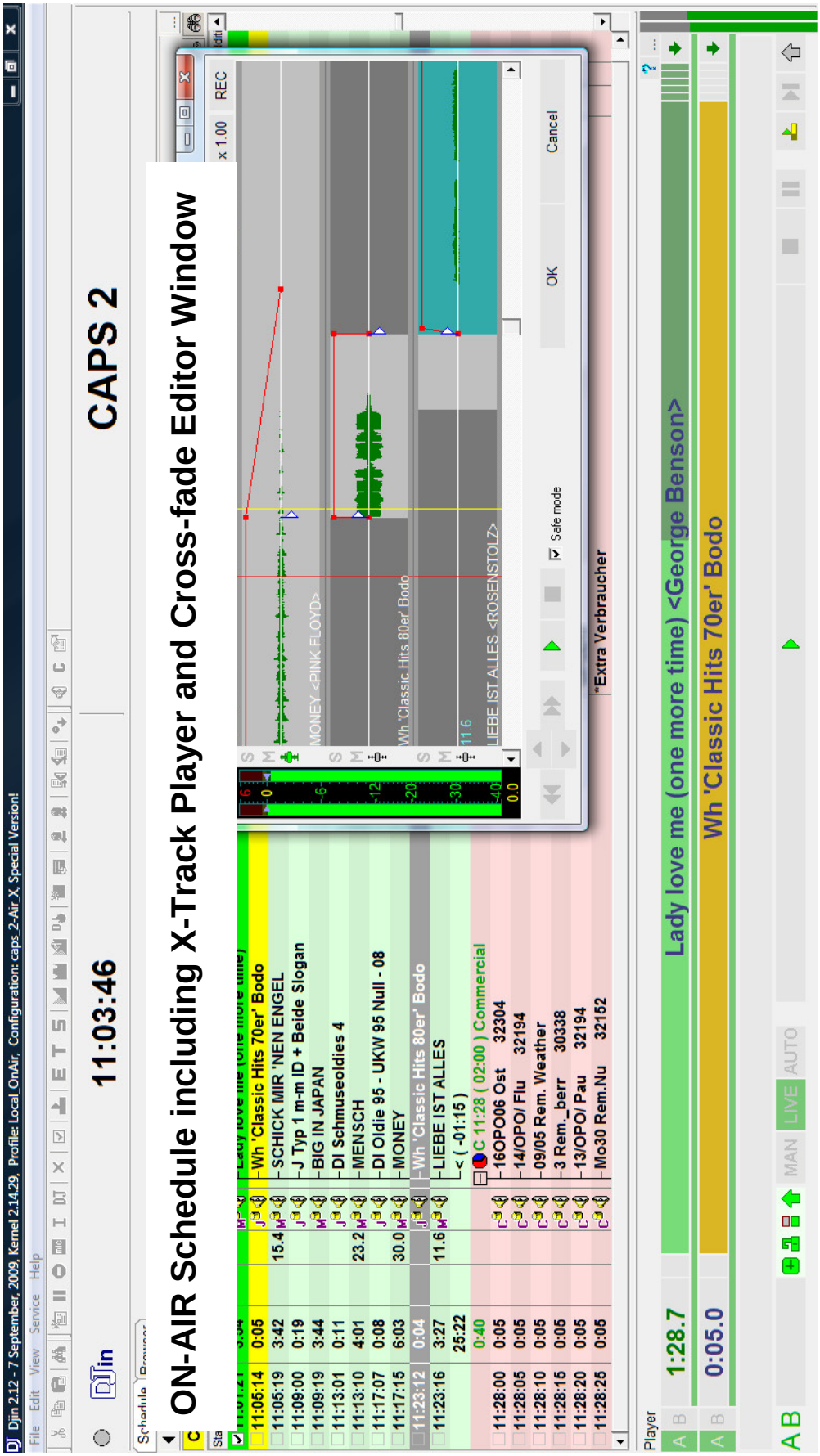
ON AIR STATION

Double screen configuration. Right screen





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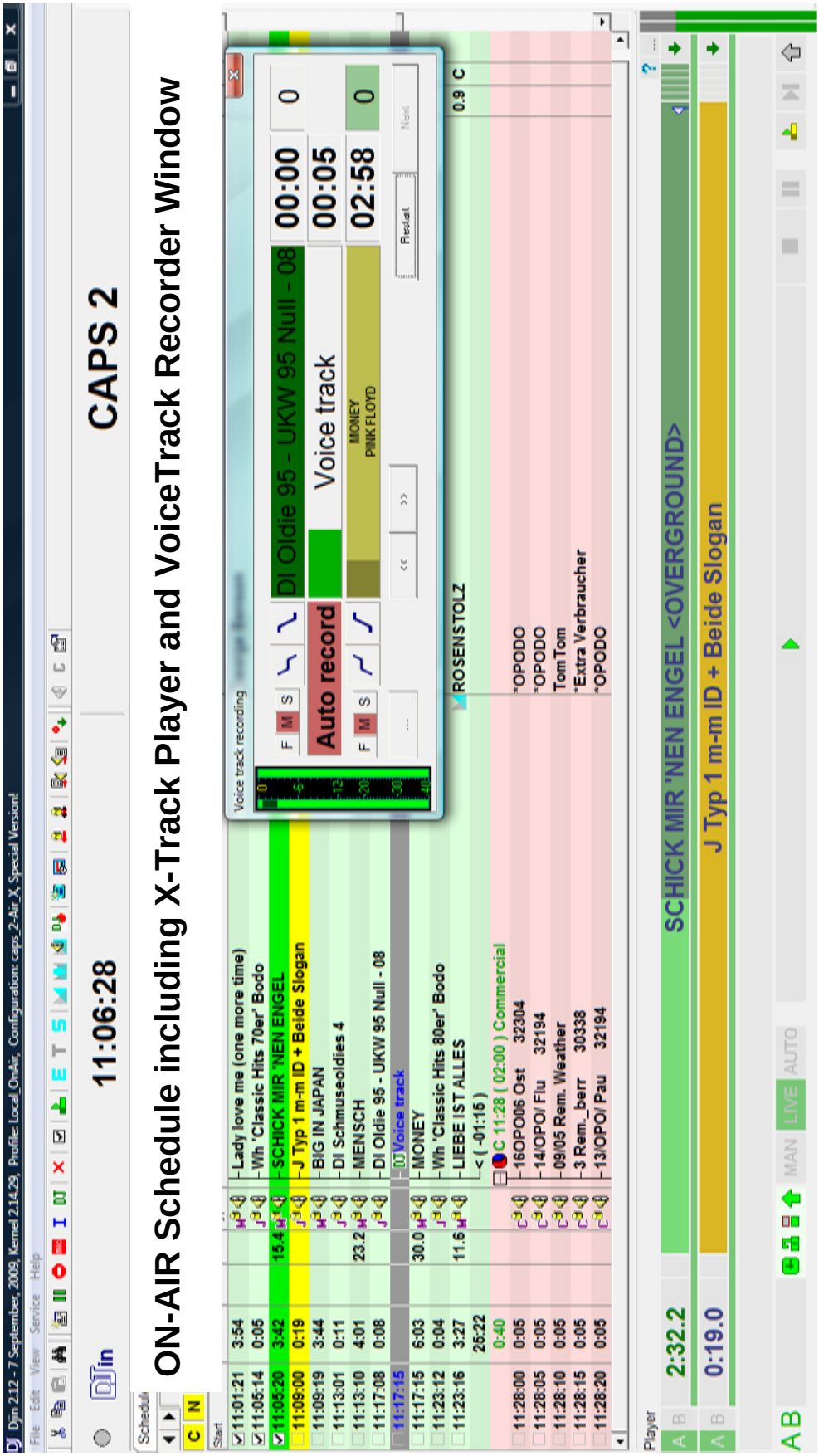
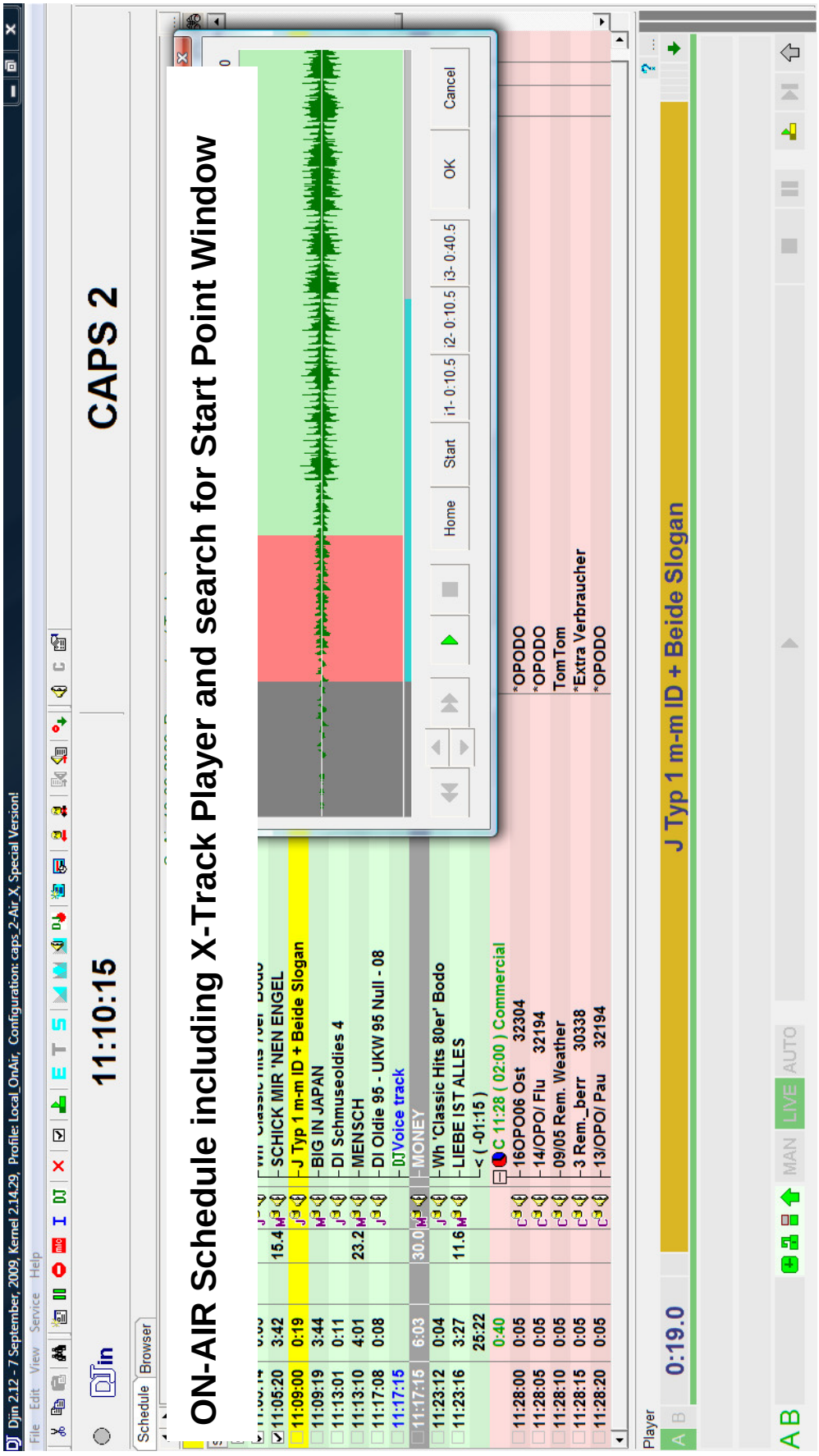
ON-AIR Schedule including X-Track Player and VoiceTrack Recorder Window





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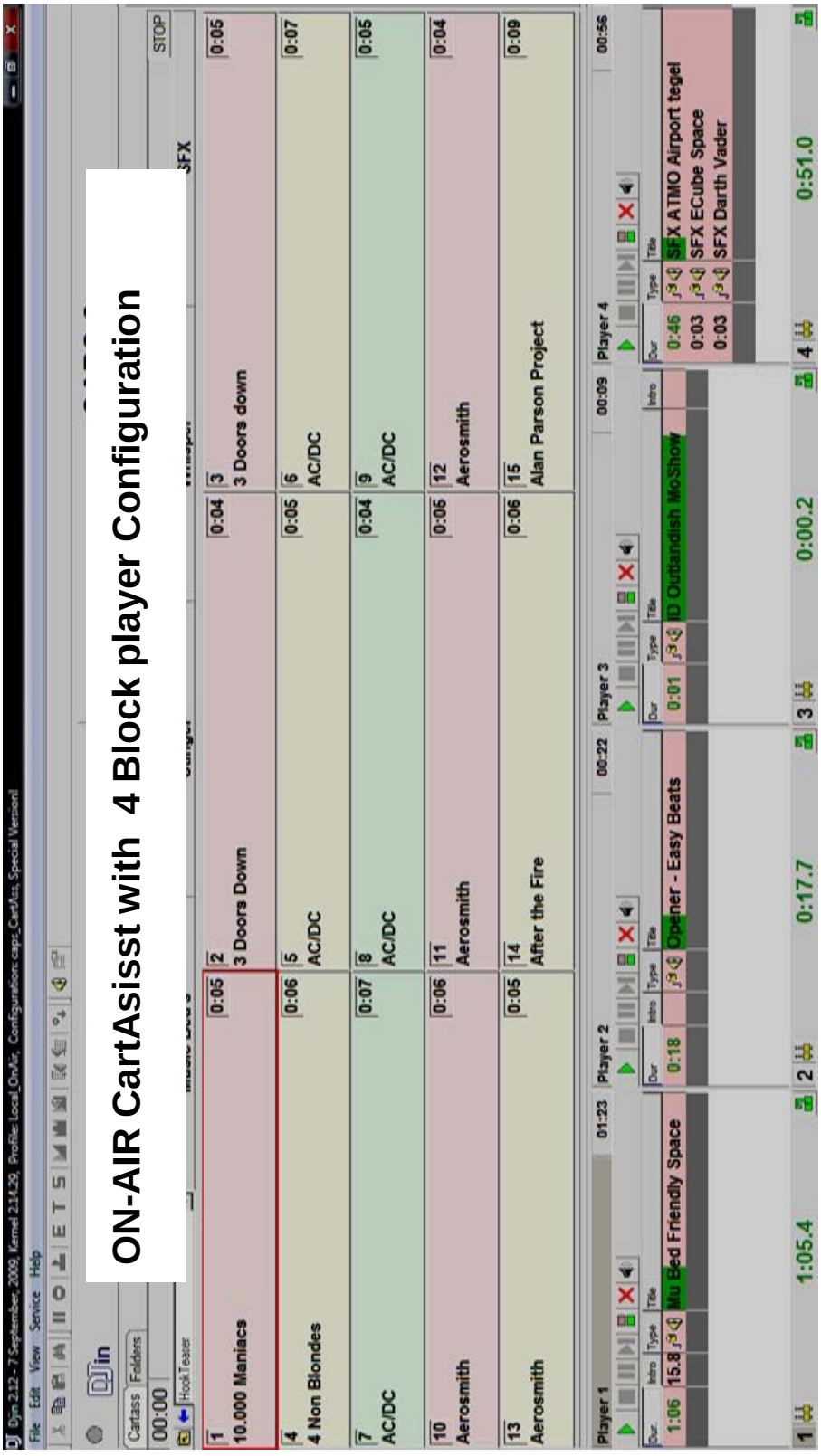
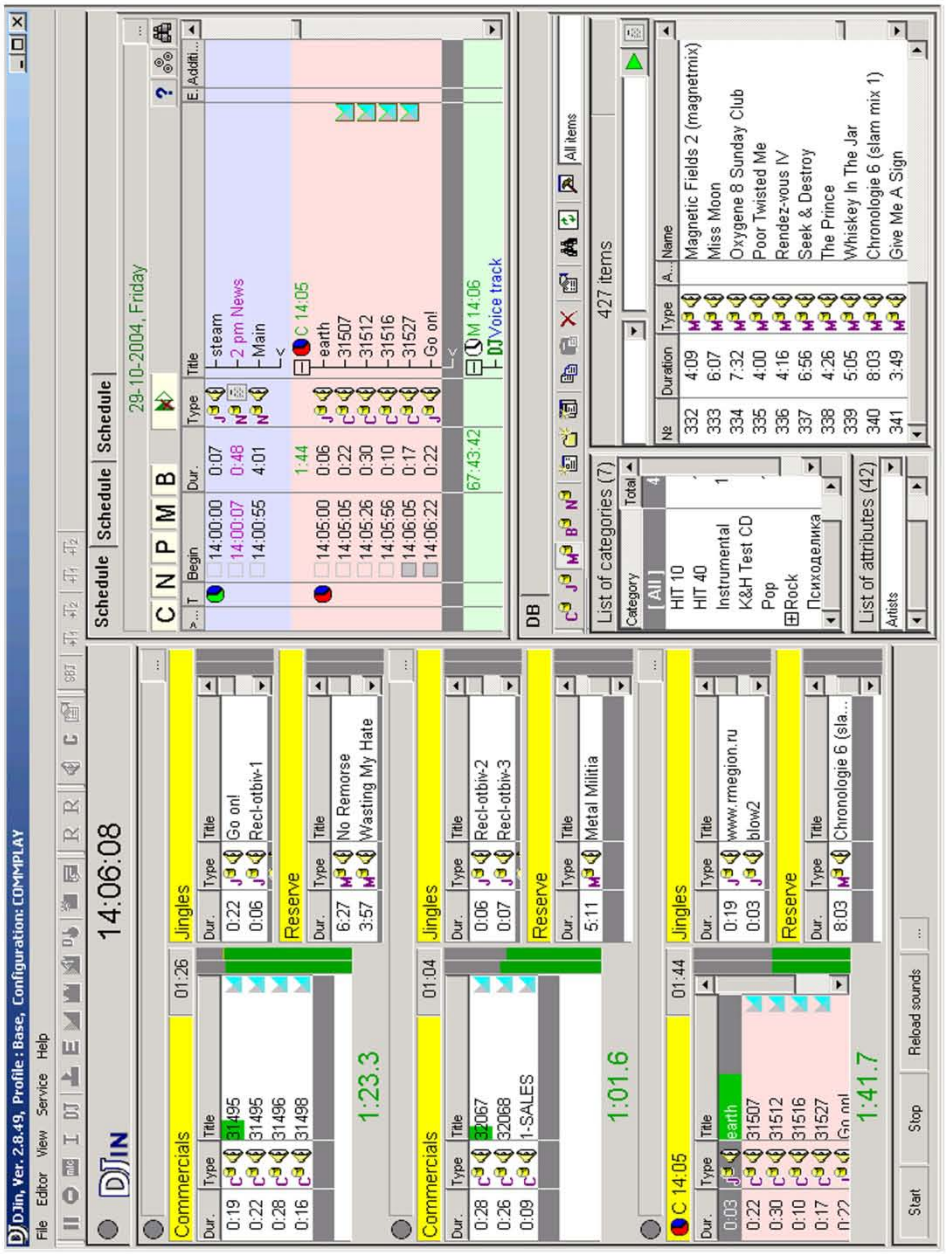

ON-AIR CartAsisst with 4 Block player Configuration

Multi Channel Player for automated Insertion Regional Program Content



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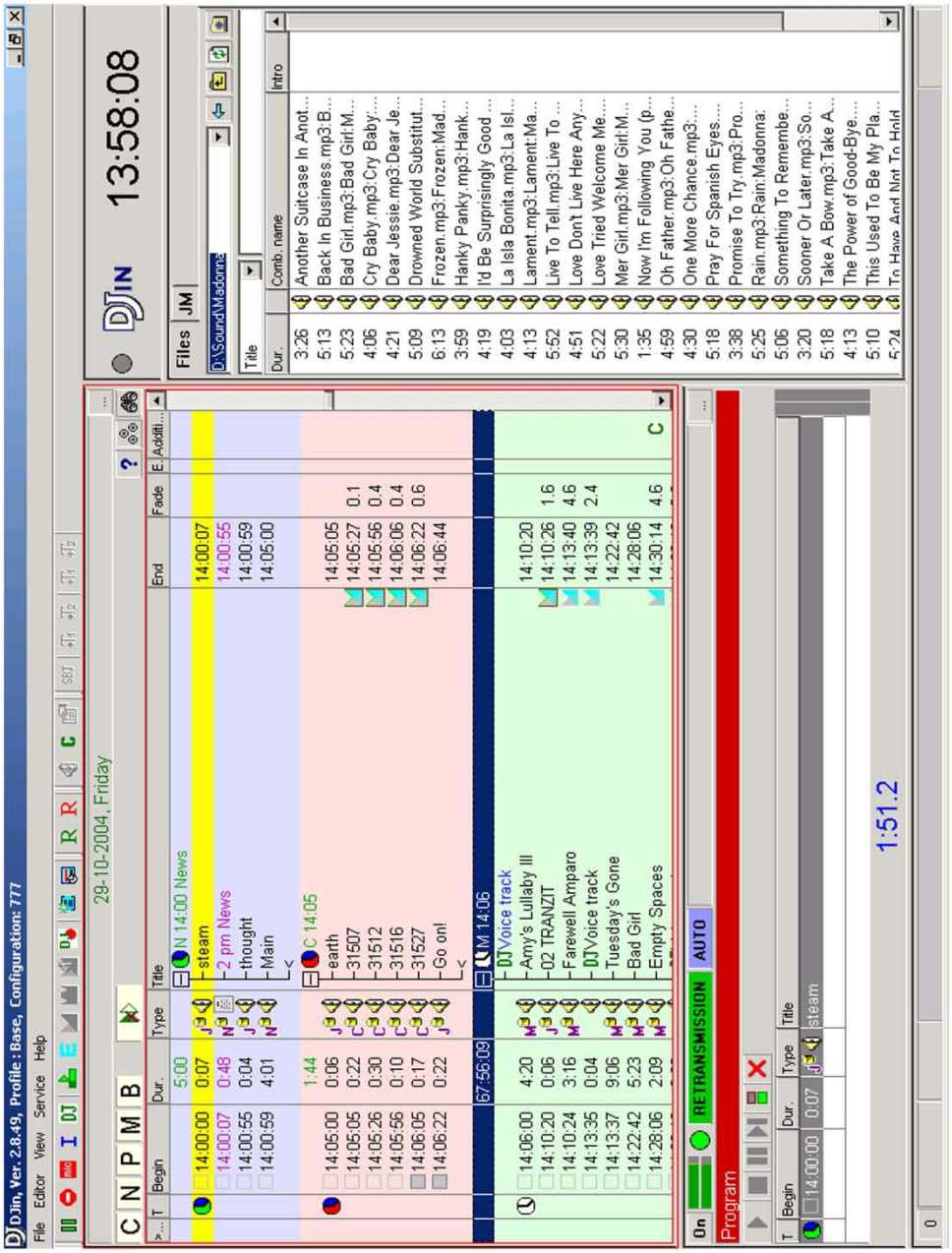
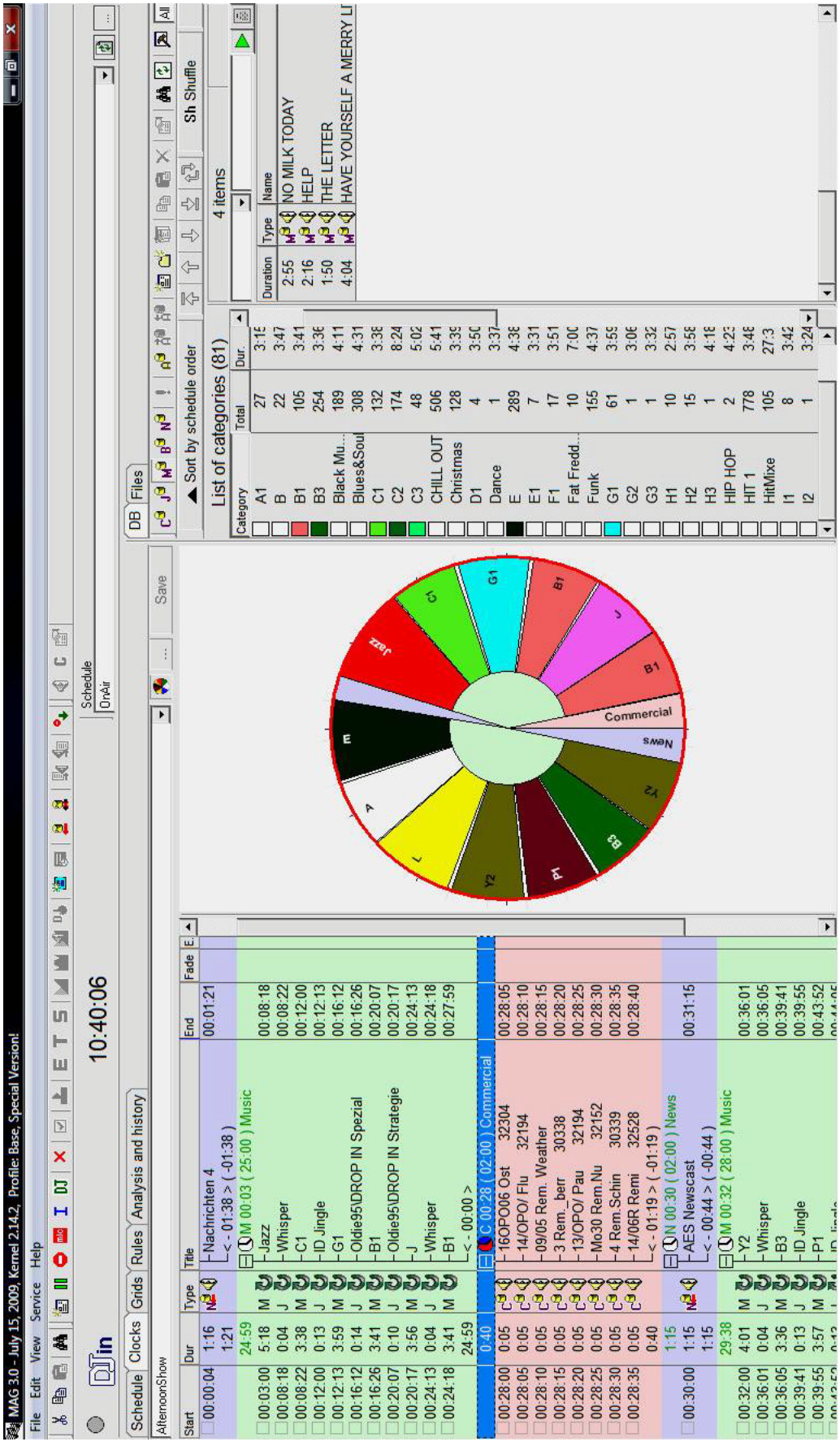
Retransmission Station for automated Insertion of Local Content to Main Program



MAG ON-AIR Schedule Planning including Music & Jingle Selection and Rotation



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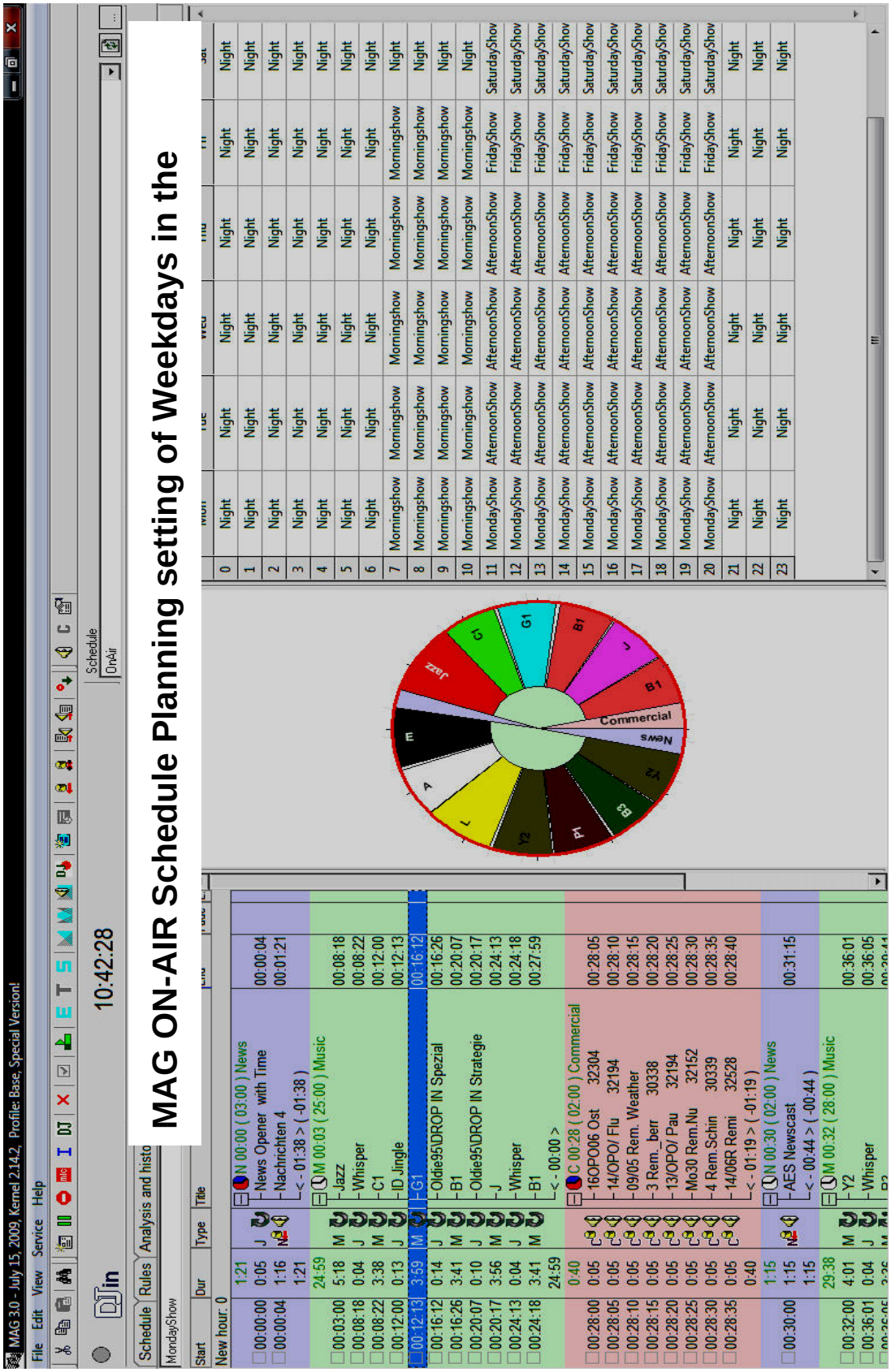
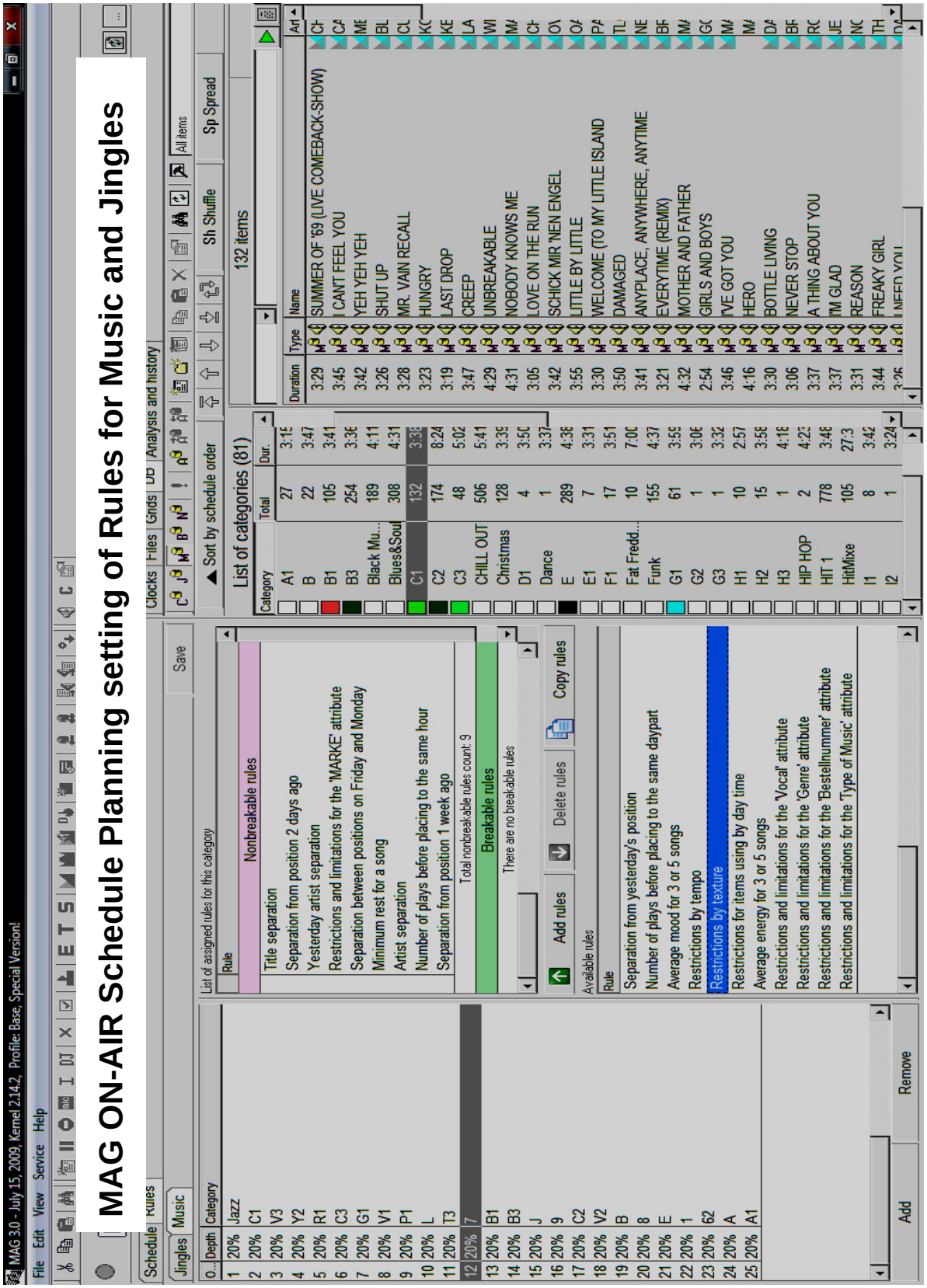
MAG ON-AIR Schedule Planning setting of Weekdays in the



MAG ON-AIR Schedule Planning setting of Rules for Music and Jingles


MAG 3.0 - July 15, 2009, Kernel 2.14.2, Profile: Base, Special Version!
File Edit View Service Help
Schedule Rules
Jingles Music
Save
Clocks Files Grids DB Analysis and history
Sort by schedule order
List of categories (81)
Sh Shuffle
Sp Spread
All items
132 items
List of assigned rules for this category
Nonbreakable rules
Title separation
Separation from position 2 days ago
Yesterday artist separation
Restrictions and limitations for the 'MARKE' attribute
Separation between positions on Friday and Monday
Minimum rest for a song
Artist separation
Number of plays before placing to the same hour
Separation from position 1 week ago
Total nonbreakable rules count: 9
Breakable rules
There are no breakable rules
Add rules
Delete rules
Copy rules
Available rules
Separation from yesterday's position
Number of plays before placing to the same daypart
Average mood for 3 or 5 songs
Restrictions by tempo
Restrictions by texture
Restrictions for items using by day time
Average energy for 3 or 5 songs
Restrictions and limitations for the 'Vocal' attribute
Restrictions and limitations for the 'Genre' attribute
Restrictions and limitations for the 'Bestellnummer' attribute
Restrictions and limitations for the 'Type of Music' attribute
Add
Remove

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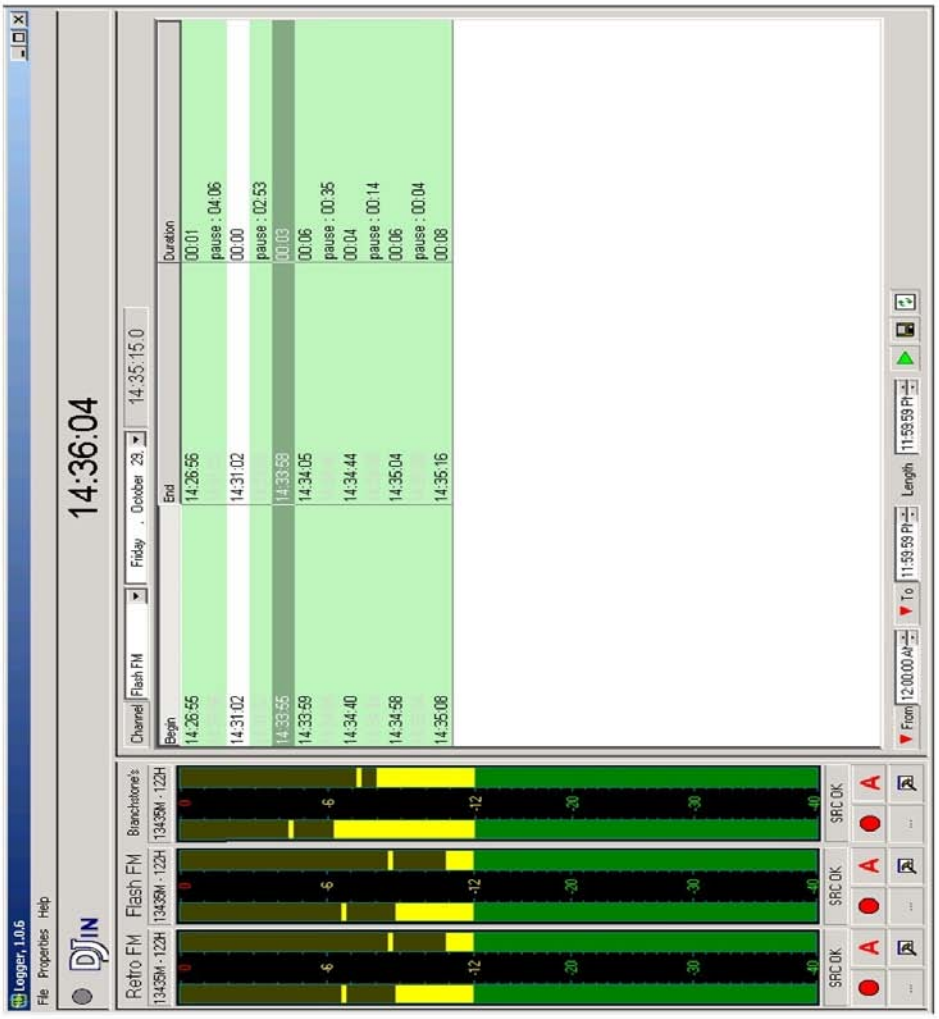
LOGGER STATION



10. Personal Remarks

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